DOCUMENT RESUME

ED 163 908 IR 006 226

AUTHOR	Park, Ben; Pawlowski, Arthur
TITLE	Planning the Use of Telecommunication in Vocational Rehabilitation.
INSTITUTION	New York State Office of Vocational Rehabilitation, Albany.
SPONS AGENCY	Rehabilitation Services Administration (DHEW), Washington, D.C. Office of Human Development.
PUB DATE	Mar 78
NOTE	127p.
EDRS PRICE	MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS	Evaluation Methods; Models; *Program Descriptions; Program Design; Program Development; *Program Planning; Systems Approach; Technological Advancement; *Telecommunication; *Vocational Rehabilitation

ABSTRACT

This study considers telecommunication as a technological extension of fundamental human communication, and elaborates on telecommunication in a specific area like vocational rehabilitation, the relevance of previous experience with telecommunication to vocational rehabilitation, deciding where telecommunication will be best placed in a process model for long range planning, and designing and using the process model. Sufficiency, reliability, adaptability, and utility are detailed as four criteria against which telecommunication systems can be evaluated so that the study may be used as an approach for planners in determining which problems in their local situations may be resolved by some form of telecommunication. A 57-item bibliography is included. (JEG)

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Planning the Use of Telecommunication in Vocational Rehabilitation

by
Ben Park
(with Arthur Pawlowski)
March 1978

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This work was supported by a grant to the New York State Office of Vocational Rehabilitation from the Rehabilitation Services Administration, Office of Human Development, Department of Health, Education, and Welfare.

5/18/78

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Dedication

To planners, administrators, providers of rehabilitation and other services; to counselors and workers with the handicapped; and most especially, to handicapped people and their organizations as they assume increasingly important roles in directing their own destinies.

Acknowledgements

Many people assisted this project. We wish to acknowledge their help, with thanks.

The Advisory Panel listed on a preceding page gave us a great deal of their time and excellent advice on all the matters covered herein.

Nathan Slater, Efy Karpman, Leonore Pearl, Maureen Bentley, Diane Cox, Vince Ceccacci, their colleagues, and clients of the Federation of the Handicapped in New York City, provided us with a thorough orientation to their work and their problems.

Frank Gentile, Dick Switzer, Fred Francis, students, teachers and other professionals of Human Resources Center/Abilities, Inc., in Albertson, N.Y. spent many hours with us, showing and explaining the future they have been making for handicapped people.

Frank Argento, Jack Clarcq, Phil Weinbach, Wynene Fenderson, and many of their colleagues at the National Technical Institute for the Deaf, Rochester, N.Y., reviewed for us their extensive program of research and training.

Domenic Mettica and Molly Richardson, with several of their students and co-workers at the Tel-Catch Project in Buffalo, N.Y., showed us how remarkably well a telecommunication project can work for homebound students.

Our appreciation to many people and organizations working for the handicapped, such as Milton Levine, and the Association for the Health of Retarded Children, Freeport, N.Y.; John Beard and Fountain House, New York City; Dorothy Peters, Peg Ingolia, Priscilla Webster, and their colleagues and clients who tried to do something new with cable television for homebound people in Peoria, Illinois; Anna Fay and Carr Massi of the National Paraplegic Association, Institute for Rehabilitation Medicine at New York University Medical Center, New York City; Bertrand Bensam and Marilynne Saviola of Goldwater Hospital in New York City; the teachers and students who make up the Brooklyn Teleclass of homebound pupils.

In the field of new telecommunication, we are particularly grateful for the advice and information provided by Jack O'Neill, Marcel Zobrak, Carol Paquette, Art Bennett, and their associates at the Mitre Corporation; Robert Johansen, Jacques Vallee, and Kathy Spangler of the Institute of the Future; Albert Fredette and the Interactive Radio Network out of WAMC, Albany, N.Y.; Lorne Parker and his colleagues pioneering the real use of the telephone from the University of Wisconsin Extension, in Madison; Murray Turoff and Roxanne Hiltz at New Jersey Institute of Technology;

Earl Dunn, David Conrath and their associates researching interactive telecommunication systems for health care from the Universities of Toronto and Waterloo in Canada; the many researchers who have reported their experiences with ATS-6 and CTS satellites; our friends in the field of telemedicine, who got us started in all this — Rashid Bashshur, Reba Benschoter, Ken Bird, Maxine Rockoff, Dean Seibert, Al Shinn; and those who are the greatest inspiration of all — the people of Berks Community Television (BCTV) in Reading, Pa.

To John Carey and Martin Elton, colleagues at the Alternate Media Center, thanks for their thoughtful comments and suggestions about the approach and substance of this study.

Special thanks, finally, to people in the New York State Office of Vocational Rehabilitation who gave valuable advice from the point of view of their own hard-won experience: Lenore Lipka, Joseph Palevsky, William Patterson, Naomi Richmond, Lou Salzman, Robert Steinberg, Roland Sturm, John Woods.

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Author's Foreword

For many years we have heard that telecommunication will someday be a major support of our social institutions, that it will enable all of us to have a greater share in the fruits of our society. Over the past decade the promise finally has begun to be fulfilled. A wide variety of systems of telecommunication enable the provision of vital services to populations otherwise difficult to reach, by professionals and other providers who are often at considerable distances from clients or colleagues. Many individuals previously isolated by geography, disability, or adverse social conditions, have been linked with people they want and need to be in contact with, for services, socialization, and enrichment of their lives.

Telecommunication does not always work well for every situation or organization or individual. Negative reactions have been encountered where professionals and ordinary laymen have perceived a new telecommunication system as being imposed on them for reasons and purposes not of their own choosing. It is difficult for any of us to accept someone else's prescription about how we ought to communicate; we have to want to communicate in the new fashion or we simply will not do it.

Nevertheless, it is easy to understand that leaders and policymakers in a field as large and as patently needful of innovation as vocational rehabilitation should wish to advocate the exploration of telecommunication for its potential contributions to the support of the vocational rehabilitation process. The painful reality of VR is that it cannot reach everyone it should be reaching; it often cannot assist many disabled people who are eligible for service because of their isolation from the services it can provide. Telecommunication should be able to alleviate this sort of difficulty as well as to enable better communication with outstationed professionals and better access to continuing education and in-service training by many overworked professionals. There is no question but that some of these objectives can be attained in some situations. This study suggests an approach for planners to use in determining which problems in their local situations may be resolved by some form of telecommunication.

(As long ago as 1973, O'Neill and his colleagues* concluded that more than 50% of the substance of social services is information exchange of one sort or another and that this can be accomplished by telecommunication. Now, in 1978, the promise of telecommunication for such purposes is closer to realization.)

---

* O'Neill, Paquette, Polk, and Skinner (1973).

Before going further, just what do we mean by "telecommunication"?

F.1 Definition of telecommunication

"Telecommunication," as used throughout this paper, means interpersonal communication by means of an electric or electronic system, transmitted over wires or fiberoptic filaments or through the air via electromagnetic waves, or beams of light. The stress is on interpersonal communication: telecommunication is thus taken to mean an interactive, two-way exchange using sounds, pictures, alphanumeric symbols, or combinations thereof. The technologies involved may be telephone, television, radio, electronic keyboards, facsimile, electronic blackboard, or holograph. With the exception of transactions conducted via electronic keyboards which are linked with computer memory, these telecommunications are "live": time for all parties involved is synchronous with present events. In telecommunication, participants are at some distance from each other at least greater than can comfortably be bridged by some face-to-face means; distances are most often measured in miles, but may be measured in hundreds of yards.

The one-way signals emanating from broadcast television and radio stations are not included in this study; such signals are referred to as "Broadcasting" and are generally included in the concept "Mass Communication" along with newspapers and popular periodicals.

The outputs of videotape, videocassette, audiotape devices, and other recording and reproducing equipment, are treated here as audiovisual equipment, which may be used to supplement a telecommunication system.

F.2 The approach of this study

As indicated above, this study advocates an approach that promises at this time to make practical sense from the author's point of view, and from the point of view of those who have had the opportunity to study or engage in the use of telecommunication:

- Planners should first of all experience the use of telecommunication for one or two of the problems they are attempting to resolve, so that they can begin to learn the sorts of constraints and opportunities telecommunication imposes and promotes.

This study and the approach it suggests are only a beginning to a process of planning and development none of us can see the end of. Certainly there are other approaches. This one is rather informal. It puts a great deal of responsibility for imagination on the planners and the group they assemble to help them do the planning. Throughout the study it is stressed that very few hard-and-fast methods toward implementing telecommunication can be generalized from the relatively limited experience to date. Thus there are large areas of uncertainty, and to confront them this study suggests a good deal of flexibility and local adaptation as well as the involvement, from early planning stages, of quite large numbers of potential users and people with previous telecommunication experience. It also suggests a good deal of openness from the beginning as to the modes of telecommunication to be considered, because first and foremost are the needs and wishes of potential users as these can be met with the use of available resources.

F.3 Some assumptions about the study

The study was undertaken and has been written up on the assumption that the people who will read it know very little if anything about the newer forms of telecommunication that it discusses. It further assumes that:

A. The reader will know where vocational rehabilitation is situated in his or her state government, will understand its particular and local characteristics as well as its priorities and the methods by which they are determined.

B. People who know a good deal about electronic technologies for broadcasting or audiovisual presentation have not necessarily had much experience with using the newer systems of telecommunication. However, the assistance of such people is indispensable for lighting, sound balance, and other purely technical aspects. They must be cautioned against the understandable temptation to see the communications in the new modes of telecommunication as broadcasting or audiovisual presentation, because the hardware used in telecommunication is the same as or very similar to what is used in the one-way presentation forms with which they are familiar.

C. In terms of their fundamental communication wants, needs, and stategies, neither clients nor professionals in vocational rehabilitation are different from anyone else in their culture. Telecommunication systems are arranged first and foremost to accommodate the capacities of people to project auditory and visual signals and to make sense of the signals projected by others. What is special about communication in vocational rehabilitation are the modifications to accommodate physical disabilities of some clients. The greatest part of these consist of audio-only systems for the blind, and sight-emphasizing systems for the deaf (such as Teletypewriters for the Deaf, captioning over a television picture, or signing — either as interpretation of a speaker or interactively between signers at a distance from each other). Other modifications in terminal equipment run a gamut from what is widely-available, such as hands-free telephone, to what is very highly specialized, such as voice-activated keyboards. But the systems of telecommunication in which such accommodations may be embedded are not different from any other systems. They are to be used, after all, equally well by both handicapped and non-handicapped people, in a manner that makes no distinction among the communications of the people using them.

D. The reader will understand this study is an assembly of guidelines and experiences based on the current state of the art of telecommunication, not a recipe-book for making telecommunication applications; and that, further, each communication problem for which a telecommunication solution is considered must be considered afresh, because in significant part, it will be unique.

F.4 Some clarifications: research and evaluation

The study does not suggest methods for conducting social science research in telecommunication or for the application of cost/benefit measures. The reader who is interested in these issues is encouraged to begin his or her search with Conrath et al. (1975, 1977), Durbin (1978), and Pool (1977), as cited in the brief bibliography.

The study does, however, suggest four criteria against which telecommunication systems can be evaluated: sufficiency, reliability, adaptability, and utility. These are treated in numerous examples in Chapter 1 and again returned to in Chapter 5. As indicated above, however, neither these nor other criteria and concepts are reduced to quantitative form. Another set of criteria has been developed by Elton and Carey (1978) in their evaluation of implementation in field trials and demonstrations of telecommunication systems.

Finally, though it is not likely that this study will serve all the needs nor meet all the expectations of those who read it, the Table of Contents has been detailed so that one can find what it does contain.

F.5 Organization of the study

The route taken is from the general to the particular: from consideration of telecommunication as a technological extension of fundamental human communication through telecommunication in an activity like vocational rehabilitation, previous experience with telecommunication that seems relevant to vocational rehabilitation, gearing up to plan the use of telecommunication in vocational rehabilitation, deciding where telecommunication will be best placed in a Process Model for use in long-range planning, designing the Process Model, using the Process Model in planning. A brief summary of the contents follows.

F.5.1 Introduction

This chapter is divided into two parts: A Place for Telecommunication in the Scheme of Things; and A Place for Telecommunication in Vocational Rehabilitation. It is based on the theory that language is the distinguishing characteristic of the human species and that all forms of communication, including telecommunication, depend on language; and that the face-to-face environment is the one in which we learned how to communicate and that all other environments are tested against it. The qualities of telecommunication which enable it to qualify as a reliable communication context are enumerated, and from this the expectations that we have of telecommunication. It then follows that the establishment of new uses for telecommunication modes must measure up to those expectations or be doomed to failure. Nevertheless, new applications of telecommunication do emerge, because they have proved useful.

In order for telecommunication to be useful in vocational rehabilitation, we state as the major premise of this study that "long-range and wide-scale planning ... requires that substantial numbers of people in and around the planning enterprise be experienced in the use of telecommunication." A rationale for the development of a capacity to plan concludes that planners must organize something which we call a Process Model (a test-bed for trying out and demonstrating the kinds of things one needs to communicate in the field of vocational rehabilitation and in the lives of handicapped people, and performing these activities via telecommunication).

F.5.2 Chapter 1 -- Telecommunication responses to communication problems in vocational rehabilitation

This chapter spells out the specific relationship of telecommunication environments to face-to-face environments using definitions of face-to-face adapted from the work of Erving Goffman. It asks what we must take from face-to-face settings to other communication settings in order that the latter will qualify as places in which human communication behavior is possible and can be rationally performed. Moving to vocational rehabilitation, we expose planners to their first tasks: determining what are the necessary behaviors and conditions for communication in vocational rehabilitation — so as to determine what must be taken from these former face-to-face behaviors and environments into telecommunication-mediated ones.

By comparing the communication capacities in various telecommunication technologies with the communication capacities in familiar environments (face-to-face, print, telephone) we begin to discover (or deduce) which of the newer telecommunication modes enable the kinds of activities that are characteristic of vocational rehabilitation.

The bulk of the chapter is devoted to recounting in some detail salient experiences from previous telecommunication projects. Here planners can read explicit examples of activities that have been carried on in the various telecommunication modes. Each example has some relationship to behavior(s) that might be carried out in vocational rehabilitation, and each is evaluated (where it is rational to do so) on the basis of criteria of sufficiency, reliability, adaptability, and utility, so as to give the reader some indication of its applicability to the behavior(s) in vocational rehabilitation that she or he may have in mind.

F.5.3 Chapter 2 -- Developing the capacity to plan: involvement and preparation

This chapter suggests how planners can organize a planning group including staff personnel in the state vocational rehabilitation agency and a large Planning Advisory Group (consisting of other agency staff, representatives of clients and professionals in vocational rehabilitation, and various experts in telecommunication technology and utilization). This chapter reminds planners of relevant planning factors in vocational rehabilitation and lists some of the major assumptions that underlie the use of telecommunication. It suggests how the planning group can begin to grasp the concept of telecommunication by using available systems of telecommunication; finally, it introduces the concept of test scenarios as diagnostic tools to determine the kinds and degrees of acceptance, resistance, willingness to innovate, and understanding of telecommunication that are present in the planning group and in potential users of telecommunication alternatives.

F.5.4 Chapter 3 -- Selecting targets for telecommunication

This chapter deals with the issue of what specific activity is to be selected as the first one to utilize a telecommunication alternative. This is a major step toward commitment to developing the Process Model, not merely as was done in Chapter 2 — grasping the concept of telecommunication through use of some available telecommunication system(s) — but deciding to go ahead with a minimum three-year commitment to performing a regular ongoing agency function via telecommunication.

The suggestion is made that the planning group select the "most severe contingency," a high-priority obligation in vocational rehabilitation that has proved very difficult to discharge. A rationale for this position is spelled out. However, it is also suggested that, if the agency is unwilling to commit a high-priority obligation to telecommunication resolution, then it may consider a non-sensitive and peripheral activity — exposing its efforts to the risk of limited relevance but to little risk of criticism in the event of failure.

The chapter also includes some suggestions on ways of thinking about the costs attendant on a new telecommunication venture.

F.5.5 Chapter 4 -- Designing a short-range Process Model in which to develop a longer-range thinking and projects

The designation of "short-range" in the Process Model does not mean to imply that, if successful -- which it is very likely to be -- the Process Model should not be continued. The thinking here is that the Process Model, focused on a single VR problem, will constitute both a first step and a test bed for the development of ongoing planning. It is likely that the Process Model will become the nucleus of a larger system as different and new activities are added to those for which the system first was formed.

This chapter outlines a step-by-step method for designing and implementing the demonstration test bed, the Process Model. Planners will have to exercise considerable innovative ingenuity and avail themselves of the services of people with explicit expertise in order to flesh the outline, which runs from selecting a specific locale, prospective users, technical components, and local sites, through a period of simulation prior to final commitments, criteria for programming, suggestions about formats for interaction, and strategic intervention to criticize and improve communication in the system.

F.5.6 Chapter 5 -- From short to long range: using the Process Model for planning

Once the Process Model is in place and functioning it can begin to be used for planning new activities in telecommunication. A growing cadre of staff and volunteers, planners and other vocational rehabilitation professionals and administrators, and clients in individual and organizational capacities, will be experiencing and understanding more and more about the use of telecommunication. This group will become the focal point of expanded programming and activities.

The large planning group can now begin to apply the evaluative concepts first suggested in Chapter 1 to their own Process Model and its activities. Planners can examine the communication problems of individuals to see where the system needs correction and development. New technology should be displayed and discussed, then tried out in the Process Model (if possible). If use of new technology cannot be explored within the existing system, members of the planning group will now have sufficient understanding of telecommunication to know what kind of system it needs and how to go about securing the use of such a system. The planners should begin to develop a wider constituency of users both from vocational rehabilitation and from other institutions with concerns for the welfare of disabled people as well as for social service in general. A growing telecommunication system may well have considerable unutilized time and can share its overhead and operating expenses among a number of user groups.

At some point, a network of systems should begin to emerge as the lessons learned about the use of telecommunication for the state's or group's specific needs in vocational rehabilitation can be translated to the design and implementation of other systems in other locations. As the planners gain experience in use of telecommunication they will be able to make connections with other existing telecommunication systems.

Introduction

Part I — A Place For Telecommunication in the Scheme of Things

> ...the gift of language is the single human trait that marks us all genetically, setting us apart from the rest of life. Language is, like nest-building or hive-making, the universal and biologically specific activity of human beings. We engage in it communally, compulsively, and automatically. We cannot be human without it; if we were to be separated from it our minds would die...
>
> ...we spend our time sending messages to each other, talking and trying to listen at the same time, exchanging information. This seems to be our most urgent biological function; it is what we do with our lives.
>
> Lewis Thomas (The Lives of a Cell)

Each of us is characterized by his or her own preferences and peculiarities in communicating. We learned our separate and characteristic communication talents in face-to-face environments. Much as we may, increasingly, observe and borrow from television and other media, we refer everything back to face-to-face contexts for testing and proof of legitimacy, because this is where communication is "real" to us. When we say something does not "ring true" in a movie or television program we often mean it does not accord with what we believe would be the case were we to encounter the "artificial" situation in a face-to-face context. Our language is shot through with expressions that imply the face-to-face corrective: "I'll believe that when I see it with my own two eyes." "Seeing is believing." "He wouldn't dare say that to my face." "I can't wait to see you." "I'm looking forward to meeting you in person."

Small wonder it is often difficult initially to encourage people to use the new telecommunication environments, especially professionals, whose use of language is what defines them and their activities to non-professionals as well as to themselves and their colleagues. It is asking a great deal of people that, for the performance of activities crucial to their existence, they abandon the security of the environment to which those activities are natural and, instead, use environments which they have every right to suspect are not only difficult but also lacking in capacity to permit the projection and reception of communication with the clarity, range, and shadings of meaning that face-to-face environments make possible.

Also, it is small wonder that it has been difficult for investigators of the new telecommunications precisely to describe or replicate satisfactory use of telecommunication environments except in the grossest terms. Each individual and group of individuals behaves differently enough and each environment is different enough that extrapolations to other groups and other environments have been unreliable or impossible. We do know, however, that certain specific telecommunication projects, allowed to develop in response to the requirements and demands of their users, have been spectacularly successful in overcoming intractable difficulties and providing new opportunities, such as:

- bringing together providers and users of services who otherwise could not get together
- making scarce resources such as professional services available to larger numbers of people than had otherwise been the case
- enabling the extension of services to areas and people otherwise unserved or underserved
- eliminating the need for expensive and time-consuming transportation
- speeding the processes involved in situations in which efficiency was a factor, such as emergencies.

The means by which systems of telecommunication enable these sorts of benefits in communication processes include:

- elimination of distance as a factor; people are brought together, by voice and hearing, image and seeing, or both, while remaining at or near their working or living locations; ("distance" may be psychological, rather than spatial, as when barriers of language, social distinction, or education are surmounted)*
- provision of access to communication at places where people are: homes, institutions, work-places, neighborhood centers; in short, places which are comfortable and natural
- increase of frequency of contacts, by aggregating individuals in natural groups and bringing them together with service providers and others with whom they wish to communicate; groups are put together by wires or over-air signals which reach all members (at home, work, etc.)
- often, telecommunication not only can reproduce sounds and pictures accurately but also in greater scale (i.e. magnified) or at greater volume in order to enhance perception

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* The telemedicine cable link from Wagner Houses in southeast Harlem to Mt. Sinai Hospital in Manhattan aided Hispanic patients, who might not have ventured into the hospital itself, to "visit" physicians with their children via two-way cable television.

- significant others (family, attendants, teachers, friends) can be brought into communication transactions for enhancement of follow-up procedures

- reduction of costs, as economies of scale are achieved, as need for transportation is eliminated, as professional services are made more widely available with greater efficiency, etc.

Modern systems of telecommunication already have enabled the extension of human contacts such as health care services from major medical centers to people in remote communities and isolated neighborhoods in big cities. It has been demonstrated that telecommunication possesses the capacities to shrink distance, relieve isolation, make scarce human resources more widely available, put people together who need and want to be together, and save time, effort, and money in the process. Although thus far, as stated above, no general rules have appeared for using telecommunication, there have been several successful applications of telecommunication modes to social objectives. From these experiences, a few general tenets have emerged:

1. Inasmuch as communication is a fundamental human activity, requiring cooperation and complementary behaviors among people, so must those people (or their representatives) be involved in the planning process for a telecommunication system.

2. Successful incorporation of telecommunication is a long-term process; this process must be embarked on as a long-term, open-minded commitment to trial-and-error implementation, study, evaluation, and developmental change.

3. It is not possible to plan the use of telecommunication until the people to be involved have some experience in the concept of telecommunication as an alternative means for the transmission of human interaction. Until people can conceive how they can carry on communication in environments mediated by electric and electronic technology, they cannot plan the use of the technology; and they cannot conceive how to carry on such communication until they have had experience in its use.

The apparent "which came first, chicken or egg?" problem in the third tenet can be resolved, as suggested later in this paper, by the planning group's starting out to use the most common telecommunication system, the telephone, in new ways designed to develop thinking and action toward the use of other and newer telecommunication technologies.

Over the past two decades, a number of successful systems have come into being. All such successful systems would subscribe to the above tenets. All have exhibited some broad basic behaviors and have fulfilled certain basic conditions, as well. In all cases, there was:

- a substantial community of users of the telecommunication system who were agreed on the basic uses of the system. In most cases, the basic uses for these successful systems became indispensable to the community of users.

- a minimum period of operation, not less than three years; leaders of some systems would argue that an even longer initial period should be guaranteed.

- an evolution of applications as desired by users of the system (as opposed to purely experimental applications mandated by a research grant).

- evidence of flexibility to develop new uses, incorporate additional groups of users, to change and expand interpersonal interaction methods and technological protocols.

- ample demonstration that the system's success rested principally on accomplishments unique to the system, which were associated with local people, local services, local attitudes, local wants and needs. (This is one reason why so very little of a concrete nature is extrapolable from one telecommunication project to another. Purely local concerns were inseparably bound up in the development of the applications.

Experience with telecommunication systems to date indicates that people will use the systems only if they *want to*, only if the technology allows them to communicate in ways they perceive as normal, and only if they feel comfortable with the equipment rather than dominated by it. Generally speaking, people will *voluntarily* use a telecommunication-mediated environment only if they feel it is doing something for them,* such as:

- alleviating intractable problems of illness or mental anguish

- entertaining them, giving them something pleasant to do; promoting social contacts with friendly people, people who are interesting and enjoyable

- furthering their business or financial interests, helping them make more money, save money, improve their careers; and providing them with what they feel is valuable information.

Considering their understandable usual reluctance to conduct important affairs outside face-to-face settings, it is again small wonder that people demand some pay-off for taking the trouble — and the risk — of exposing themselves to the uncertainties of a new telecommunication system. We must also remember that up to the present, people who have used the new telecommunication systems have been pioneers. A physician in charge of an experimental telemedicine system linking clinics in two rural Minnesota towns explained why his medical colleagues were not using the system very much: "Physicians are the only people in the community with this thing. If others had it — when it gets as common as the telephone — then it will be thoroughly accepted."*

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* That is, novelty effects may entice people to try a system out; these effects cannot last long.

The list of conditions prerequisite to acceptance and use of the new telecommunication systems does not end there. People will use telecommunication technology for help in relief of problems, for answering crucial questions, for helping to alleviate social isolation only if the system does these things in some way better than otherwise they could arrange. Recognizing that the raw communication itself cannot be better or richer than what occurs face-to-face, "better" must mean, first, the provision of essential human communication that otherwise could not have occurred at all, and second, communication that could otherwise have occurred only with difficulty or with such great expense that, as a practical matter, it might well not have been undertaken. For example:

- Homebound handicapped children in and around Buffalo, NY, receive individual teaching and learning at home via two-way computer-based instruction transmitted on cable television channels. This system also provides recreation and entertainment options through interactive games.

- Health care personnel and their patients in northern Ontario villages (a thousand miles from the nearest general hospital and accessible only by airplane or on foot most of the year) can get immediate consultation from two major Toronto hospitals via a combination of voice by telephone and "slow scan" still pictures transmitted from the villages to the hospitals; even with its manifest value for assistance in patient care, the health care personnel using the system did not become comfortable with it until they had the opportunity to engage in social and working exchanges among themselves, as well as unpressured informal exchanges with the physicians in Toronto. They could not use it well until it achieved some status as a means of communicating "normally."

- Old people in and near Reading, Pa., most of whom were becoming progressively more isolated and disconnected from friends, family, and other contacts, now have daily contacts with a rich variety of others including young people, social service professionals, local government officials and well-known people, as well as other elderly, in a local cable television system where two-way transmission of "live" voices and images provides semblance of the sights and sounds one sees and hears in face-to-face settings. This system, based initially on the need for better delivery of services to the elderly and on the need for citizen-government interaction, has enabled the elderly to go much further and to reinstate themselves with active roles as valued and respected members of society.

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* Jon Wempner, M.D. Director, The Lakeview Clinic Telemedicine Project, Waconia, Minnesota. Personal comment to the author (quoted in Park 1974, p. 62).

If salient behavior and changes in behavior in the use of a new communication environment take place at the level of language, we should expect:

- that these changes will not be subject to control because the evolution of language is not subject to control
- that employment of the telecommunication system will continue to be local in nature because as it continues to develop, it will reflect changes in local usage both inside and outside the system
- that, because systems not only employ and depend on local usage but create new elements in local usage, telecommunication systems (unlike mass national/international communications) will be responsible for the genesis and development of distinctive differences in local usages, thus making replication of such systems even less likely.

This does not mean that new telecommunication systems are not subject to organization and control of elements essential to the realization of explicit goals. Surely, the following aspects can be determined within broad limits, organized, and controlled:

- Subject areas. (Will the system be devoted to health care, public administration, vocational rehabilitation, police work, other things, or a combination of things?)
- Clientele. (Membership. Who can use the system? The public at large, or a particular group or groups? Large numbers, small numbers, their affiliation based on interests, problems, civil requirements, etc.?)
- Locations. (Installation of terminal hardware will often determine where communication will take place; configuration of the distribution system — wires, frequencies, and their routes and strengths — will dictate the areas in which locations can be placed.*)
- Personnel. (Staff, to organize and operate the system. Paid, volunteer. Numbers, functions.)

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* This applies only if locations are fixed. Systems using the telephone system will usually permit flexibility as to location.

- Policy decisions. (Who will make them? To what extent will ordinary non-institutionally-affiliated users of the system be included?)
- Hardware. Budget. Duration. Schedules. Program. Degree(s) of privacy.

All these can be organized and controlled. They are issues that belong to explicit system planning, discussed later in this paper. But the planner has to be concerned, as well, whether people will use the system that is set up. This paper is concerned with this issue more than it is with the others.

Part II — A Place For Telecommunication in Vocational Rehabilitation

Larger numbers of handicapped people are demanding (and legislation is mandating) more vocational rehabilitation services to the handicapped at a time when available funds and professional personnel are decreasing. Increased productivity and efficiency are required if the demands and mandates are to be met. The use of telecommunication is suggested as one part, perhaps a major part, of the answer; there is little question but that telecommunication can do much of what is wanted. The major premise of this paper is that long-range and wide-scale planning for the use of telecommunication requires that substantial numbers of people in and around the planning enterprise be experienced in the use of telecommunication. The corollary is that without such a large and experienced group — comprising administrators, counsellors, field workers, and a broad spectrum of the handicapped people whose interests are what the enterprise is all about, as well as planners and professional experts in telecommunication — the planning enterprise cannot be undertaken. This premise is not very different from one that would require a substantial number of people who know how to read and write to plan a newspaper.

What is essential to the planning enterprise is an understanding of what people can and cannot do in communication environments comprising both people and the technologies that mediate their interaction. Examination of any current vocational rehabilitation activity will show that, no matter how individualized the focus, a large number of cooperating, communicating people are required to carry it out. Currently those people are operating in communication environments with which they are familiar. Put the same participants in a new and unknown communication environment and, until they have learned something of how communication is conducted therein, the new difficulties arising from the environment itself will overshadow the difficulties that inhere to the matters at hand.

Each communication environment requires explicit understanding of its rules, manipulations, capacities, constraints, drawbacks and opportunities; each environment provides explicitly different approaches and solutions to the problems and questions being addressed within it. But perhaps, more importantly, each situation (locale, specific people, local idiosyncrasies, specific subject matters being negotiated, and many other particulars) is unique and uniquely transacted within the specific (and atypical) communication environment. The point cannot be stressed too much; that is why it is being stressed.

A Rationale for the Development of a Capacity to Plan ought to go something like this:

1. In order to utilize telecommunication technology, some people must first have opportunities to become experienced enough with the pursuit of their own specific vocational rehabilitation activities in such environments that they can begin to extrapolate their own experiences to further activities in related technologically-mediated environments.

2. "Some people" in the foregoing must be loosely-organized into a group of planning participants. The group will include planners, administrators, counsellors, field workers, teachers and therapists, a few telecommunication professionals, as large and as varied a representation of VR clients as possible, and — whenever feasible — representatives of other organizations with mandated interests in the welfare of handicapped people, such as schoolteachers working with handicapped students, physical rehabilitation professionals, agencies concerned with deafness, blindness, mental retardation. Members of this group will be introduced to an existing telecommunication environment and will use it to grasp a "concept of telecommunication": how it feels and how it is to accomplish communication in this new environment.

3. Having experienced the "Oh, so this is what it's all about!" syndrome and begun to think explicitly about telecommunication environments, the planning group will now proceed to plan a specific telecommunication environment to serve as a Process Model in which a specific set of problems (tasks) in vocational rehabilitation are addressed. It is in this Process Model that the planning group will gain experience in the use of a telecommunication environment for vocational rehabilitation.

4. With the Process Model in place, the planning group can begin to extrapolate other uses for other forms of telecommunication in other areas of vocational rehabilitation. This is where the Process Model becomes a short-range but necessary expedient to long-range planning. The group will have become greatly expanded by the numbers of people directly involved in the communications enabled by the Process Model; people from other localities and interested in different rehabilitation activities will have had the opportunity to observe and participate in the experience made

> available by the Process Model; experimentation by trial and error with different tasks, with new pieces of technology, will have been enabled in the framework of the Process Model. If the Process Model is maintained as a flexible and open-minded facility, it will have provided a test bed for proliferation of new telecommunication applications. The "graduates" of the Process Model will comprise a cadre who not only will greatly augment the planning group, but also will provide core groups for further telecommunication implementation.

Those organizations in vocational rehabilitation that are not prepared to undertake a commitment to developing a capacity to plan for the use of telecommunication, such as what is briefly sketched above — probably should not get involved until telecommunication has become widespread throughout the fabric of our national life.

Chapter 1

Telecommunication Responses to Communication Problems in Vocational Rehabilitation

1.1 Telecommunication environments versus face-to-face environments

Common experience has taught us that face-to-face communication involves mutual seeing and hearing, as well as touch, taste, and smell. The latter three are far less important (or we think them so) to people in western, industrialized cultures than elsewhere. Mediterranean peoples do a lot more touching than northern Europeans do; the so-called "primitive" peoples — African Bushmen and Australian Aboriginals, for example — still use the sense of smell for communicating; tasting occupies ceremonial roles, and is a source of information, along with smell, to healers and lovers in most cultures. Our understanding of the employments of the five senses arose in face-to-face settings; the term "face-to-face" embodies the prime requirement of western communication: to communicate with our faces to each other, to be able to see each other's eyes looking at our eyes. "Seeing is believing."

What exactly does the face-to-face setting provide for our communicating, what do we expect of it in the ordinary course of affairs, and what kinds of things must we be able to do in the face-to-face setting in order for our doings to qualify as communication? Erving Goffman, in three of his books (1961, 1963, 1974), has undertaken to define the characteristics and behaviors common to face-to-face settings. They are briefly summarized in Table 1.

Table 1

Characteristic Conditions of Face-to-Face Environments

Expectations

(What the synchronous auditory-visual transaction setting must provide.)

a. Evident spatial and aural boundaries. (Boundaries apparent to the senses of both sight and hearing.)

b. Copresence of the transactors.

Table 1, continued

c. Visually and aurally open lines. (Direct seeing and hearing of transactors and environment.)

d. Facilitation of synchronous feedback. (Emphasis on synchronous. Feedback is present in all the dimensions.)

e. Richness of information flow.

f. Opportunity for closure, for allowing the transactors a single, all-encompassing engagement.

g. Each giver (sender) a receiver, each receiver a giver. (Opportunity for symmetrical behavior.)

h. Consistent visual orientation. (Spatial components do not change without the knowledge of the transactors.)*

Behaviors

(What transactors must be able to do.)

i. Send embodied messages, both linguistic and expressive. (Voice and gesture, posture and expression.)

j. Receive embodied messages.

k. Initiate an encounter, by use of eye-to-eye looks as well as mutually involving gestures and speech.

l. Take leave of the encounter.

m. Present selves (body idiom and dress, bearing, movement and position, voice and sound levels, physical gesture) in accordance with the roles they wish to or feel are incumbent on them to enact.

n. Engage in aways (reveries, brown studies, reflections).

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*Note: h. Consistent visual orientation is not mentioned by Goffman. In the "real world" we expect things to be right side up and to maintain relationships to a stable surrounding. In some modes of telecommunication, switching views among cameras or omitted spatial referents can destroy orientation quite easily.

Goffman emphasizes the roles of auditory and visual expression and reception; this is useful to our purpose, because — to date, at least — telecommunication provides only seeing and hearing information.

At a very superficial first cut, it is evident that, with the exception of item h., all the items have both auditory and visual bearing. The copresent situation is not really defined by the visual implication in "face-to-face," because "voice-to-voice" also is implied, as well as the other details of sound that contribute to understanding what is happening; therefore, we continue to use "face-to-face" for conditions of copresence with the understanding that the term includes the sound dimension as well as the visual one.

1.2 What must we take from face-to-face settings to other communication settings?

When we propose to move our communications out of face-to-face settings over to ones mediated by some form of telecommunication, what must we take along in order that what we do still qualifies as communication?

People who are capable of both seeing and hearing discover very quickly that the auditory dimension is of greater "importance" than the visual. They can tolerate a considerable degradation of pictures but very little distortion of sound; when sound is lacking altogether, communication ceases, but not so if the pictures cease.*

For most people, who have both hearing and seeing, it is natural to assume one can see the person with whom one is communicating, because, so long as the lights are on, this is always possible in face-to-face settings. Seeing is given primacy (note in the author's summaries of Goffman's conditions the preponderance of visual metaphors and spatial references) in our consideration of copresent situations, even though — for most people — the bulk of the information contained in communicating is verbal. Writing arose as a visual substitute for speaking and hearing when people were not in each other's presence. Telecommunication that enables synchronous speech and hearing has reclaimed the domain of ears and voices at distance. It provides, most of the time, the capacity to convey most of what most people want to convey to each other.

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* People watching U.S. television during the 1976 Presidential campaign will recall that when the sound failed during one of the Carter-Ford debates, the entire proceedings were halted for 28 minutes until sound could be restored. One can only speculate, but it is highly likely that, had the picture gone out, the debate would have continued — after a few moments' consternation and an apology for the lack of video.

But let us resist the temptation to put a percentage on the amount of information provided by speech and hearing alone, because — in any given situation — it may be zero or a hundred. Telecommunication, interpersonal communication over distance, ought to retain its emphasis on the individuals who comprise its communicating units, and any evalution of what telecommunication must do should refer immediately back to the needs and wishes of the individuals for whom the telecommunication is intended to provide means of interacting. When, for some individuals, telecommunication provides their major means of interacting and even their sole means of communicating with the people they most need and want to be in touch with, they ought to be provided with what they need, and this may include seeing in addition to or instead of hearing. The people most deprived of ordinary communication contact, because they cannot share language in its pure form, are the deaf, for whom sight is the benefit telecommunication can grant. The statistically lesser part of professional caring practice requires sight, but in that lesser part is included almost all of physical medicine and physical therapy, for example; when sight is needed, it makes no difference that it is needed less often than hearing, and its demands are pervasive. Education and training, like caring practice, require sight less often than sound, but when they do they require it absolutely, if the matter is to be transacted at all; knowing the way things work usually requires seeing them at work, and vocational rehabilitation includes a good deal of this need for visualization. Whenever we deal with matters that are essentially spatial, we are re-convinced that one picture is indeed worth a thousand words. Matters of size and relative scale can be described inefficiently in words the need for which is obviated by a good close look.

1.3 The concept of telecommunication

Telecommunication has in common with broadcasting only the use of similar transmission technologies and end-instruments; the television set used for two-way telecommunication is no different from the one that presents the comedy of "Laverne and Shirley,"* the speaker and microphone one uses for two-way radio communication are not essentially different from what are used in radio broadcasting.

The telephone is and always has been a telecommunication device; however, since the concept of telecommunication has come in for so much emphasis over the past few years, it is becoming more widely recognized that the telephone is grossly underutilized as an instrument and a system linking only two parties at once. What do we mean by the "concept of telecommunication"?

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* A series very popular with U.S. television viewers in the late 1970's.

Chiefly, we mean interpersonal communication at a distance, as stated. Embedded in the phrase is the implication of communication flowing in both directions, and conforming in significant particulars to the expectations and behaviors outlined in Table 1, thus replicating or attempting to replicate the conditions and fulfilling the criteria by which we judge activity to qualify as communication.

With face-to-face settings taken as ideal, any telecommunication environment is inferior. The spatial and/or aural boundaries of any technologically-mediated communication are not immediately apparent and are established only with some care taken that they are established. When sound alone is the means of communicating, it is often just as well that the spatial situations of the participants be described in words if they are not known, so as to enable "visualization" of each others' surroundings; and the use of microphones should — and usually will — report a satisfactory congruence with what has been described. When synchronous pictures are included in the means of communicating, the frame of the picture and the two-dimensional perspective, both, among other factors, are limitations that need to be taken into account so as not to distort and confuse what must be clear and unambiguous — the boundaries of the space, the spatial relationships among people in the space, a consistent visual orientation, and an absence of unwanted illusions such as what can be imposed on the sense of depth by the use of lenses too long or too short.

The concept of telecommunication, however, should not require that face-to-face settings be regarded as ideal. They should represent standards toward which telecommunication can move and which cannot be grossly violated; but telecommunication environments also possess some characteristics that enhance communication in ways that face-to-face environments cannot. The simultaneous gathering together of individuals from many spaces into one space is such a characteristic; the sequential presentation or display of but one salient factor at a time, in identical focus for all participants, may be another. In some applications, notably those for medical and other professional consultation as well as for some educational purposes, the ability to obtain very great magnification of features in question and to present them for study among numbers of people simultaneously is a characteristic capacity of visual telecommunication that represents an enhancement not provided by face-to-face communication.

Another aspect of the concept of telecommunication is that of networks: individuals and groups can be brought together on the basis of their needs and interests without particular regard for either the geographic locations or the sociocultural status of their selves or their settings. If the network allows for switching, people and groups can move into or out of it as their needs and interests are being addressed; once answered, some may wish to bow out and others to be included.

The concept of telecommunication is by no means thoroughly defined, nor is it likely to be, because the processes of imagination and invention will shape and reshape it as they do language itself. Together with the purely local character which most new telecommunication systems will tend to take on, this is another reason why telecommunication is not now and probably never will be a concept reduced to replicable concrete form: its essence is dynamic, it will constantly undergo processual change and adaptation. In addition, telecommunication will for any foreseeable future continue to be refined by technological innovations and improvements.

The aspect of telecommunication most difficult to define is one's own sense, in any reasonably well-organized telecommunication transaction, of being in a setting that one can trust. The interpersonal communication seems — regardless of limitations, constraints, and one's consciousness of technological distortions — to ring true; people are heard and/or seen via the technology to be playing the roles that they play in "real life" and are not appreciably different from what one would expect to perceive if one were together with them in physical presence. This, of course, must be experienced to be understood; it is one of the things one needs to know for one's self in order to be able to contribute to planning the use of telecommunication.

The problem that telecommunication poses for the planner is uncertainty about the precise functions it will perform, the differences it will make that can be predicted in advance. What telecommunication does is provide communication environments the generalizable dimensions of which are unknown. What is clear is that communications, including the communications in delivery of services, will be performed differently from the ways they have been in previous face-to-face, written, or two-person telephone environments. The working-out of particular communication tasks will require exposure to actual telecommunication situations such as the Process Model proposed later in this paper. At this juncture, it will be well to consider the kinds of communications that are characteristic of vocational rehabilitation, so that our further thinking about the use of telecommunication will be informed by the actuality of the communication tasks likely to be encountered.

1.4 Client and professional communication functions in vocational rehabilitation

The way to think about communication functions is in the context of alternative methods of accomplishing them. The following "questionnaire" is meant to be an exercise for the vocational rehabilitation planner to undertake alone, and/or with various colleagues and interested clients. The exercise is meant to raise questions about current communications in such a way as to encourage counselors, administrators, and other rehabilitation personnel, as well as clients, to begin to consider telecommunication alternatives for performing some of the functions in vocational rehabilitation.

Functions in VR are listed arbitrarily, below, by functions that involve both professionals and clients and those that involve only professionals and administrators. Functions that involve clients will often include parents and other family members, professional consultants, evaluators, therapists, teachers and trainers, as well as prospective employers. Functions that involve professional colleagues and administrators, and not clients, will also include contacts with professionals and administrators outside one's own department or agency.

1.4.1 Functions in VR

Professionals and clients

Casefinding
Intake
Evaluation
Determination of eligibility
Counseling
Restoration
Training
Job placement
Followup

Professional colleagues and administrators

Filing reports and records
Accessing reports and records
Staff training (for central as well as outstationed)
Staff meetings and conferences (for central as well as outstationed)

The following questions can be directed to the functions listed above, as appropriate. You may be interested in addressing questions only to certain functions, or to other functions you feel should be added.

1.4.2 Questions about interactions between professionals and clients or between professional colleagues and administrators

1. Does this function require that participants see and hear each other?
    a. If so, must they be face-to-face?
    b. Must the client come to the professional? (Who pays?)
    c. If the client is homebound, does this mean the client must be brought to the professional or will the professional go to the client? (Who pays?)

2. Might a function that is now being done face-to-face be done:
    a. on a device like a video telephone, where participants can both see and hear each other?
    b. on a device where participants can talk (just as with telephone) but where only one (the professional) can see the other (the client)?
    c. on a device like b. but where the pictures the professional sees are stills of the client (full-body, face, and detail)?

3. What part of this function can be performed on the telephone?

4. Can this function be performed with a number of participants together in a class, group counseling session, therapy, training session, seminar or the like?

5. If the function can be (or is) performed by groups of participants (or at an institution) why can't it be performed in groups of groups, such as 2 or 3 groups simultaneously at similar institutions or centers?

6. What about clients or others who have difficulty in communicating and require special equipment (such as keyboards, other digital device, or voice-activated teleprinter) or special methods (such as signing)?
    a. Can the outputs of the equipment or methods be transmitted via sound only or do they require vision?
    b. Does the telephone company provide any such equipment?*
    c. Are there other kinds of equipment available for use by people who have difficulties in communication?**

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* Best way to find out is to call them. Every Bell Company, for example, has representatives who specialize in equipment for use by handicapped persons.

**See Zobrak et al., v.III, (1977) for a recent survey of end-instruments especially designed to interface with electronic transmission systems.

7. Is this a function that could be performed by a person using a keyboard device for access to records, programmed instruction, or to make inputs to records?

There are other tasks and situations that might be performed well via some form of telecommunication, for example:

A. Professional training. Outstationed professionals are not the only ones who could be served by telecommunication. Professionals working in urban and suburban settings, including institutions serving the handicapped could benefit from (a) comprising classes large enough to warrant regular training programs and (b) attending classes at their normal stations during normal working hours, not having to leave their stations and travel any distance, being therefore available at stations for all time except class time, not having to attend classes on an overtime basis outside normal working hours, or attending classes outside ordinary working hours but with no overtime necessary for travel.

B. Alleviation of homeboundedness: the social dimension. Current thinking in the field of rehabilitation, among organizations of the handicapped, and more and more encouraged by the provisions of the law, is that a much larger portion of the handicapped population should have the opportunity for self-determination, that is, making their own choices about how to live and work. Telecommunication can be a powerful instrument for achieving these objectives. Interaction with employers who want to explore ways and means of putting more handicapped people to work. Telecommunication that enables employers and handicapped potential employees to meet, discuss, and dispel misconceptions about requirements and liabilities associated with employment of the handicapped could be beneficial both to the interacting participants in such dialogues and to other employers and handicapped people who can witness the interactions.

C. Involvement of other family members. When telecommunication enables home contacts, this also means that the handicapped person's family may be reached, as well. Counsellors and other rehabilitation professionals in the New York metropolitan area, and other urban areas where the VR process is conducted almost exclusively outside the home environment, note that maintenance of contacts with other family members is often extremely difficult. As telecommunication permits a greater share of the VR process to occur in homes, other family members can be invited to understand better what is expected of the handicapped person and, in turn, to take more active and understanding roles in the rehabilitation of their handicapped members.

1.5 Auditory and visual components to be reproduced by telecommunication

Table 2

Auditory and Visual Components

What are the auditory components? What quality?

	Voice	
Hear		Volume. Amplify/suppress
	Non-voice	
Speak		Frequencies. What ranges?
Produce non-speech sounds		Fidelity. What degree?

What are the visual components? What quality?

Naturalistic (People and things)	Non-motion	Single viewpoint	Color	
Alphanumeric	Motion	Multiple view (angles)		Fidelity
Graphic/Cartoon	Semi-motion	Multiple views (sizes)	B & W	
Other				

Table 2 brings us back to consideration of seeing and hearing factors in interpersonal communication. In the left-hand column of both auditory and visual components are indicated the natures of those components in face-to-face settings: hearing and things heard, seeing and things shown. In the right-hand column or columns are indicated picture or sound qualities that need to be considered when reproducing and transmitting audio or video elements via some form of communication technology. One must ask about all the items here, heard or seen, whether they are to be applied to interactions participated in by individuals or groups, because of the different kinds of technology that may be implied (for example, a purely auditory interaction between individuals requires no more than a handset such as a telephone; but audio interaction between groups implies microphones and loudspeakers, as well as a larger space).

1.6 Comparison of communication capacities in various telecommunication technologies

In the following Table 3 we see a list of telecommunication technologies expressed as environments along with face-to-face. This table relates to the preceding one as follows:

- Of the environments capable of enabling participants to speak and hear, all except the telephone and CB and amateur radio can be manipulated with regard to sound frequencies and fidelity, as well as volume. The three named are not characteristically associated with a high quality of sound transmission.
- Of the environments capable of enabling participants to see, all except the last three (CAI and keyboards) can transmit color as well as black-and-white. Likewise, all except the last three can deliver all points of view on photographic subjects.

The telecommunication technologies herein referred to are:

Telephone is well-known in its person-to-person mode, and even to some extent in its conference mode, where a group of people can converse together from a number of locations. Recently, however, there have been significant innovations in both technology and systems which enable very large numbers of participants to hear each other with great clarity, and which incorporate simultaneously-used visual materials; in the most advanced systems, visual materials (which are not transmitted but projected or otherwise made available at each location) are cued from a central, chairing location.*

Interactive television enables all participants to see each other in full motion and to speak synchronously; this is "live" television interaction. When groups of people are involved one does not usually see everyone at all interacting locations all the time, but rather the few who are currently conversing. The television pictures are transmitted via microwave systems, coaxial cables (such as what is called cable television or CATV, but is capable of carrying any electronic signals, not just television), newer technologies such as lasers and fiberoptics, and — for very long distances — satellites. Interactive television pictures are almost never carried by ordinary television broadcasting stations because they occupy the full television channel which broadcasters use for mass one-way programming.

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* See Parker and Riccomini (1976) or write to Dr. Lorne Parker, University of Wisconsin Extension, Old Radio Hall, Madison, Wi 53706, to obtain updated reports on the most recent opportunities in use of the telephone.

Video one-way/audio two-way enables all participants to talk together and to hear each other all the time, but the pictures are all from one source. Some medical applications of telecommunication use this mode; the patient is the subject of the video, but patient and physician, and others, can converse at will. In some educational applications, the teacher (and whatever students are with her or him) is seen by all, but numbers of students at several locations can speak to the teacher and to each other. The methods of transmission can be the same as for interactive television, with the obvious exception that only one video channel is required. Audio, however, can be managed by the use of telephone conference techniques or by use of interactive radio (see below).

Still video/audio two-way is similar to video one-way/audio two-way except that the pictures are motionless (stills), pictures may be transmitted in both directions or one direction depending on the needs of participants, and the mode is much cheaper to operate because pictures (produced by slow-scan television, frame-grabbers, or facsimile devices) can be transmitted on ordinary telephone lines.*

Interactive radio, whether transmitted on citizens' band (CB), amateur bands, or FM sidebands (used through Subsidiary Communication Authorization — SCA — granted by the FCC) is similar to telephone conferencing in that all participants can hear each other, but different in the organization of the transmission facilities. The only one that can be used formally and exclusively is SCA, where the special receivers that are required can be distributed only by the holder of the authorizaton. Organization of interactive radio transactions is different from telephone conferencing in that only one speaker (or other sound source) occupies the frequency at a time.

Computer-assisted instruction, (CAI) enables learners at keyboard terminal devices to interact directly with lessons and games programmed through a computer. Recently, homebound students in Amherst, NY, a suburb of Buffalo, have been able to have CAI in their own homes (and some institutions, as well) because lessons are transmitted on the local cable system in response to signals sent from the home terminals on telephone lines to the computer. A similar system is being developed at Albertson, N.Y.

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*Slow-scan and facsimile devices both scan an image linearly and present it for transmission line by line. Both require some time for transmission. Frame-grabber "freezes" a single frame and holds it indefinitely.

Transmitting/receiving keyboards (conference mode) are linked through a computer program so as to enable all participants in the conference* wherever they are situated in the world to come into and out of the conference at will. One simply calls the telephone number of the computer network, couples the keyboard terminal through the telephone lines, provides proper identification, and can then ask for messages, review the statements made in the conference over any length of time, input messages for all conferees or specific ones, determine if any other conferee is "on line," and hold a "dialogue" in ordinary language with that person.

Transmitting/receiving keyboards (access mode) are linked to computer programs which give access to files such as client records; one can review such records and also add to them from remote locations. One can also use keyboards to enter data in research files and to use computer-programmed mathematical and statistical procedures. Keyboard terminals can receive information either as hard copy (typed) or on a cathode-ray tube or television picture tube.

The distinction between symmetrical and asymmetrical interaction in Table 3 refers only to the participants being similarly or dissimilarly seen or heard in the communication environment. In most cases, there is no inherent difference; but in video one-way/audio two-way a difference is built into the mode (only one participant or group of participants is seen but all are heard), and in CAI one is using a keyboard while the computer delivers programmed material.

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* Typically of a few months' duration.

Table 3
Comparison of Communication Capacities: Face-to-Face, Print, and Telecommunication Technologies.

	Speak	Gestures Expressions	Write/ Type	Stills/ Graphics	Symmetrical Interaction [1]	Asymmetrical Interaction [1]	Synchronous Time (Live)	Delayed Time
	Hear	See						
ENVIRONMENT		Motion	Semi-motion	Non-motion				
FACE-TO-FACE	X	X			X		X	
PRINT				X				X
TELEPHONE (INDIVIDUALS OR CONFERENCES)	X				X		X	
INTERACTIVE TELEVISION [3] (MICROWAVE, CABLE, SATELLITE, ETC.)	X	X	(X)[2]	(X)[2]	X		X	
VIDEO ONE-WAY/AUDIO TWO-WAY[3] (CABLE, SATELLITE, ITFS, ETC.)	X	X	(X)[2]	(X)[2]		X	X	
STILL VIDEO/AUDIO TWO-WAY[3] (SLOW-SCAN VIA TELEPHONE, ETC.)	X			X	X		X	
INTERACTIVE RADIO (SCA, CB, AMATEUR)	X				X		X	
COMPUTER-ASSISTED INSTRUCTION (CAI)[4] (LAND LINES, CABLE)				X		X		X
TRANSMITTING/RECEIVING KEYBOARDS[5] (CONFERENCE MODE)				X	X			X
TRANSMITTING/RECEIVING KEYBOARDS[6] (ACCESS MODES)				X	(X)	(X)		X

1. Symmetrical/asymmetrical refer only to the telecommunication systems, not to social/hierarchical arrangements.
2. Any technology capable of the illusion of motion is also capable of semi-motion or non-motion.
3. Digital response to CATV is coming into use. This allows a viewer at home to respond to questions, vote, shop, call for help etc. with a touch-button pad. There also is use of TV sets for electronic games.
4. CAI usually responds on a cathode-ray tube device. Thus, the use of home TV sets linked to CAI systems via cable.
5. Keyboard conferencing involves an intervening computer to store conferees' messages. Print-out is usually hard copy.
6. Access by keyboard to stored information is, obviously, a sister to CAI and conferencing. It is used both to enter and to access records (symmetrical) and to request information from stored programs such as diagnostics and statics (asymmetrical).

1.7 Salient experiences from telecommunication projects

Previous experience in telecommunication has demonstrated the use of particular technology in particular settings. Much of the previous experience can be extrapolated to the requirements of rehabilitation; a small portion of it has already involved handicapped people. It may not tell us much in the way of predicting what applications will be successful, what kinds of ideas will meet with participants' approval and satisfy their needs; it certainly does not tell us anything about how to plan for unanticipated consequences. What experience does tell us is that telecommunication has been a *feasible* way of accomplishing some peoples' basic communication tasks.

Experience has demonstrated:

- *sufficiency* of auditory and visual transmissions for the performance of tasks requiring quite fine discrimination
- *reliability* of transmission over distance and under adverse circumstances
- *adaptability* of technology to the human needs that were addressed, as well as human capacity to adjust behaviors so as to take better advantage of the technology
- *utility*, in that ordinary users (non-technical people) have been able to organize and sustain information exchanges on their own, without constant assistance (and interference) from technical people.

Following the criteria of sufficiency, reliability, adaptability, and utility suggested above, we will review briefly some salient experiences from telecommunication projects.*

1.7.1 Telephone

It is fairly meaningless to review criteria of *sufficiency* and *reliability* in the telephone; everyone who reads this will have her or his own estimate from personal experience. In telephone *conferencing*, however, which is what primarily interests us here, recent technological advances have greatly improved the sufficiency of signal strength and signal-to-noise ratio to meet the needs of exchanges between numbers of people simultaneously. One no longer experiences faint indistinguishable croakings as the voices of some of the conferees; in a number of telephone conferences with different groups of people over the past couple of years both the author and his colleagues have heard the other participants easily, and this seems to have been the experience of most people. Since it is now possible to use end-instruments made by manufacturers other than AT&T's Western Electric, it may be that these contribute to the improvement.

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* Here the reader is enjoined to consult the references and brief bibliography at the end of this paper, especially Elton and Carey (1978), which is a critical review of telecommunication projects to date.

The Educational Telephone Network, ETN, operated by the University of Wisconsin - Extension, is one of the very large systems that uses a great deal of such hardware.* Its service has proved so sufficient that education programs have been developed in several areas, including English, law, social work, pharmacy, nursing, agriculture, and engineering. ETN operates at low unit cost (25 cents per "student contact hour") because of its huge size and volume of traffic; the network comprises approximately 200 participating locations in 120 Wisconsin communities, each of which is equipped with a speaking-hearing unit (3 loudspeakers and 4 microphones with "push-to-talk" bars) that can accommodate as many as 200 people, although most sessions are attended by far fewer. The total number of ETN participants per year, however, approaches 30,000, who use nearly 2,000 hours of network time in about 1,500 separate interactive sessions, nearly 30 per week of more than an hour apiece. That sort of use would not happen if ETN where not both sufficient to its participants' needs and very reliable. ETN is more interesting, though, in the area of adaptability.

Recognizing the limitations and constraints imposed by lack of the visual dimension, the managers of the network developed a valuable array of adaptations which not only go far in compensating for that lack but also in improving understanding of the process of interacting via multipoint sound transmission. These are a few of the types of things developed and in regular use:

A. reference materials for pre-session orientation

B. visual aids of many kinds for use during presentations

C. simple ground rules for efficient use of the system that are understood by participants very quickly

D. methods of encouraging and sustaining participation

E. response mechanisms and methods for evaluating sessions.

With such adaptations, those in charge of planning series and sessions are effectively equipped with tools for organizing and enhancing the interactions.**

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*Large systems such as ETN are to be found in several places, among them Illinois, Ohio, and Quebec; all of these systems show experience similar to Wisconsin's.

** See Dick, Robert, "Staff Meetings by Telephone" in Parker and Riccomini (1976, pp. 75 - 79).

It would be puzzling if telephone conferencing did not rank high in the criterion of utility (ability of ordinary non-technical users to organize and sustain information exchanges without assistance from technical people). On the contrary, we should expect the use of the telephone to set a standard of ease and comfort for the whole field of telecommunication.

1.7.1.1 Vocational rehabilitation

In a more modest but also more relevant application of conferencing by telephone, homebound handicapped students in Brooklyn, NY, meet regularly with their teachers in small groups via a system which permits the teacher to set up a standard telephone conference, among a small group with a switchboard device that not only serves as an audio bridge holding as many as twenty separate lines in a common audio system (where all hear all), but also indicates by a light indicator which student is talking. The Brooklyn students, although their interactions need not be and are not so highly organized as in the ETN situation, have adapted the system to their own needs for socializing with other people; interactions reflect the considerable hunger of homebound youngsters for the company of other young people. Sessions are not lacking in educational activity; but it is noteworthy that the students manage to make as many comments to each other as they do to their teachers.

A final note that may astonish some readers: the Wisconsin ETN network transmits a wide enough range of frequencies with sufficient clarity that it is used regularly for music education. In the 1975-76 school term, both Eugene Istomin and Eugene List worked on separate occasions from their own keyboards in New York City and Rochester with private piano teachers scattered throughout Wisconsin. What this means is that rehabilitation personnel ought to explore the use of telephone facilities such as Wisconsin's where they have requirements for good sound and intelligibility with populations difficult to reach through more traditional methods.

1.7.2 Interactive television

This mode of telecommunication, IATV, is dominated by health-care applications, in what is known as telemedicine. Most examples will come from health-care, but not exclusively. It is well to remember that IATV transactions in health-care tend to be preponderantly among individuals or small groups of three or four people; transactions in the fields of education, government, and aging tend to be among larger groups of twenty to a hundred or more people.

1.7.2.1 Vocational rehabilitation

In the single application of IATV in vocational rehabilitation to date, there were eight clients involved, all severely-disabled and homebound. The degree of their enthusiasm for a system whose pictures were almost undecipherable to outsiders viewing it for the first time and whose general transmission capacity was so poor that most of the time only one participant was able to be seen at all must challenge any preconception of what is meant by sufficiency and reliability. The eight severely-disabled people in Peoria, Illinois, were taking part in an experiment to provide, through an interactive television system transmitted on cable television, instruction in insurance claims adjustment and in the skills required for independent living.. The experiment was terminated before its originally-contemplated end date, and the technical difficulties in the system were so severe as virtually to have denied the participants one clear look at what was being transmitted. Yet the handicapped participants were very enthusiastic about the sytem and wished it to continue. At the end of the system's life, the participants — eight severely-disabled homebound people — gathered at a downtown restaurant to have lunch together. They must have felt they were getting something of value from their IATV system.

What apparently they got from the IATV system was the opportunity to know each other, to be helpful to each other, to be able better to understand their own disabilities by understanding each other's disabilities, to share techniques of therapy and insights unique to disabled people, and to know that people were taking their needs seriously.

Over the course of time, the participants did get to know each other (even though the bulk of their knowing was through hearing, not seeing) and to grasp very quickly their value to each other as both friends and peer counselors. They could point out barriers in each others' environments that the person who had been suffering a barrier had not been able to see. They passed on therapeutic "tricks" that had worked for themselves or someone they knew. The eight handicapped people in Peoria who could see and hear each other on interactive television became a network who had previously been unknown to each other. (Most severely-handicapped people get to know each other through institutional stays. These eight people were homebound at the time of the experiment.) The value they perceived in each others' company might not have appeared had there not been the telecommunication that introduced them.

1.7.2.2 Health care service (Telemedicine)

The technical difficulties experienced in Peoria were associated with new, unadjusted technology and were relatively unusual for IATV systems. Physicians using telemedicine links carried by microwave between Massachusetts General Hospital in Boston, and both nearby Logan Airport and the Veterans Administration Hospital in Bedford, Massachusetts, 30 miles distant, reported they were able satisfactorily to perform visual tasks requiring fine discrimination (interpretation of x-rays and electrocardiograms, examination of dermatological lesions) as well as auditory tasks (sphygmomanometry, stethoscopy, and cardiac auscultation.) Physicians and therapists using the INTERACT medical microwave network in New Hampshire and Vermont reported they could make the necessary visual and auditory discriminations in dermatology and speech therapy sessions. The principal physician using the Lakeview Clinic telemedicine system in Waconia and Jonathon, Minnesota, reported he was able to monitor from his clinic office the courses of women in labor at the hospital, to evaluate medication effects, and to observe patients receiving oxygen therapy. These examples attest that IATV can be technologically stable enough to provide audio and video signals *sufficient* to convey pictures and sounds from which physicians *feel they* can make diagnoses requiring very fine discrimination. That IATV can fail to perform well from a technological standpoint is also true, and should be kept in mind when any suggestion is made to experiment with using the mode. (That IATV is the most expensive mode is also likely to remain the case until there are major breakthroughs, such as the widespread distribution of reliable video signals through inexpensive and easily-maintained fiberoptic filaments.)

The telemedicine systems based on microwave, such as the first two above (the third was based on cable) have been quite *reliable* so long as the weather was fair. But Rural Health Associates (IATV among Farmington, Rangeley, and Kingfield, Maine) have had trouble with ice deflecting the beamed microwave signals even with de-icing equipment installed at the transmitters. A link between Blue Hill and Deer Isle, Maine, had similar troubles. In a study of system reliability from June, 1968 to October, 1970, the Mass. General links were impaired less than 1% of the time and this was due to atmospheric conditions, lightning, heavy rainfall, and heavy snow flurries. Above-ground cable-based systems can also be affected by weather. The ordinary urban system is not usually troubled; however, the Jonathon to Waconia, Minnesota links in the Lakeview Clinic system used 12.3 miles of dedicated — and exposed — cable. When first installed, it was described as "the longest antenna around." It received a local radio station and television broadcast signals from Canada's CBC, and these unwanted exotics interfered strongly with the intended pictures being transmitted between the clinic's locations in Jonathon and Waconia and the hospital in Waconia. Fortunately, the problem was corrected by the cable's designer and builder, so that the principal physician could later report, as above, that the cable's technical quality was *sufficient* to give him the security to base decisions on the pictures *he* received.

It should be expected that because they replicate more of the conditions of face-to-face interaction than any other form of telecommunication, interactive television systems show a higher degree of adaptability than other forms of telecommunication do. This is probably the case, and though there is no "hard" statistical evidence to support it, the expectation seems more than fulfilled by observational evidence.

At Cook County Hospital, Chicago (which utilized the Bell System's Picturephone) as well as in the Mass. General and INTERACT systems, personal counselling and psychiatric therapy were conducted successfully. At Mass. General, which did more such work than any other system, the chief psychiatrist observed that patients appeared to be more comfortable than in the doctor's office. At Cook County, the urologist conducting sex dysfunction therapy with individuals reported that patients on two-way Picturephone were more forthcoming with explicit details of their problems than in his office. Three-way sessions involving patients recently released from mental hospitals, their personal physicians, and psychiatrists from Dartmouth Medical Center on the INTERACT system allowed both specialist evaluation and therapeutic advice, but also enabled the non-psychiatrist physicians to gain an understanding of the relationships between drug therapies and psychological processes that was lacking in their previous experience.

Satisfactory reading of x-rays (reported above) required roentgenologists to adapt to a method of searching and scanning unlike what they were accustomed to in direct viewing. The advantage of television viewing is in its capacity to display close-up details over the entire surface of the TV screen. In order to maintain orientation, the clinician must search in a regular pattern, usually left-right in horizontal sections. Initially, this requirement discomfited some physicians. However, in time, they were reported to have adopted the television requirement as a necessary concomitant of a superior x-ray view.

At Mass. General, as well as in experiments conducted at the University of Toronto and the University of Waterloo, in Ontario, physicians preferred black-and-white television over color television, because of the unreliability of color rendition. This meant they had to "translate" the gray scale of black-and-white pictures into colors to which they are accustomed in direct view. Repeated questioning of physicians who have used IATV over longer periods or for numerous cases confirms this bias toward adapting the black-and-white image in medical practice.

Control of what one is seeing and hearing via television, as well as control of what one is projecting to be seen and heard of one's self and environment is the key to what is meant by utility. Telemedicine systems exhibit a wide spectrum of capacity for one to control these visual and auditory perceptions. In general, systems designed with human factors in mind, and allowing for remote controls of distant cameras, as well as override controls of the cameras in one's own location, provide the greatest utility, free of the need for assistance from technicians or operators. Such systems are said to be more "transparent"; the technology intrudes less on the human communication. In the Mass. General system, physicians had remote control of the cameras viewing the patients; they could zoom, pan and tilt, and refocus with controls at hand as they observed the patient on the TV monitor and maintained dialogue with both the patient and the attending health professional. Likewise, similar controls were available for the patient to use in seeing the physician. These were especially valuable in counselling and psychiatric interviewing, where the patient wants and needs even more to see the therapist/counsellor than in the purely medical context.

In the INTERACT system, cameras were usually controlled by operators — as in ordinary TV studios. These skilled individuals, who did not have other tasks, were usually capable of anticipating the requirements of remote examining physicians and/or could be instructed readily by the physician to show what was wanted.

In the Cambridge (Mass.) City Hospital system linking the hospital to three urban primary-care clinics (by microwave), the lenses on cameras viewing the patients had to be adjusted by the nurses attending the patients. The physician had to "talk" the nurse to the desired view; this was often a very time-consuming process as the nurse rose from the patient's side and manually adjusted the zoom and focus rings, re-positioned the patient, and adjusted the shot to what the physician said he wanted, or what the nurse thought he wanted.

1.7.2.3 Government, education and aging

For government, education, and aging, we will allude to three principal IATV projects, one in each of the three fields. In government, the MRC–TV (microwave) project serves the Metropolitan Regional Council comprising parts of New York, New Jersey, and Connecticut in the New York City metropolitan region — within a radius of roughly 25 miles around the city. People at a dozen centers equipped for two-way television regularly participate in interactive sessions addressing common issues in government. The INTERACT system's facilities are used more often for education than they are for medicine. In aging, a CATV system in Reading, Pa. links three neighborhood centers to which old people have easy access with a variety of other locations that are connected on a rotating basis: city hall, the local high schools, a college 16 miles distant (linked by microwave), the local Social Security office, and other sites. The criterion for these rotating locations is that they house people with whom senior citizens wish to be in close contact.

The three representative IATV projects in the areas of education, government, and aging can be examined in terms of the four criteria — sufficiency, reliability, adaptability, utility.

1.7.2.4 Sufficiency of picture and sound

Recall that in these three areas, there usually are twenty to a hundred or more participants in each session. Wide shots of class groups, participating bureaucrats, or senior citizens, mixed with closeups of individual students, teachers, lecturers, or participants, and the use of displays, charts, models, supplementary videotapes, or cooking demonstrations, imply the use of more and different but less finely-discriminating picture and sound inputs than are required for intimate sessions between physicians and patients in telemedicine.

All three — INTERACT in nurse-education and in health field course-work for vocational-technical students, MRC–TV in a wide range of government-oriented seminars and skills courses for government employees, and Reading in its highly varied schedule of interactions designed to provide education, citizen-government interaction, assistance with applications and reports, opportunities for gaining information and socializing — present as many different kinds of visual display as the medium permits, principally live pictures, but supplemented by videotapes, graphics, still photos and alphanumeric displays.

Interaction is liveliest in the Reading system, due chiefly to the fact that each interacting location has plenty of "live" microphones so that any participant can speak and be heard. Interaction is seen as an end in itself, not just a means to an end. The Reading system encourages home viewers of the interactions — who can see the proceedings on a regular cable subscriber channel — to telephone in and ask questions or make comments. From a research utilization standpoint, it is clear that all three systems demonstrate the great flexibility with which pictures can be transmitted, and Reading in particular demonstrates not only a high degree of auditory flexibility but also the potential for all-participant interaction that such flexibility helps to promote.

1.7.2.5 Reliability of transmission

In these large systems which involve groups of participants it becomes dramatically evident that reliability of sound transmission is more important than picture transmission. When they fail, or are transmitted below standard, they produce different reactions. Pictures may go bad momentarily or —very rarely — for a period of a few minutes, without any accompanying change in sound. This does not disturb students, discussants, teachers, or participants unless what is on screen requires fine detail. However, when the sound — usually people's speech — is degraded (drop in level, distortion, interference) so as to make comprehension difficult or impossible, there are immediate evidences of distress in the groups affected.

In general, however, these three projects — two microwave and one cable — do not experience much more sound and picture difficulties than are normal for other over-the-air or cabled transmissions in their areas, despite the fact that none uses camera, switching, or audio mixing equipment of high broadcast standard. In short, state-of-the-art reliability is good and is improving.

1.7.2.6 Human/technical adaptability

Here, it will be sufficient to describe behavior in the Reading project. The youngest of the three projects, it had the benefit of the experience of the projects which preceded it and was designed so as to optimize adaptability in the context of a participant group — elderly people — who were thought to have considerable need for help in this regard.

As stated above, the Reading design enabled universal access by participants to the means to participate — plenty of open microphones. All participants were within the field of view of the camera in their location. (Cameras in Reading are usually operated by younger staff people who maintain and operate equipment as well as implement the activities of the centers at other hours. The INTERACT project also uses trained camera operators; MRC–TV uses remote camera controls that are operated by an off-camera employee at each host location.)

At first, the Reading participants were somewhat at a loss as to how to behave. Very quickly, however, certain roles and behaviors developed. Within six months senior citizens regularly acted as Hosts, managing on-camera, the inter-center interactions, and as Presenters, or emcees, of interactive formats that included group question and answer sessions with local officials, cooking and shopping demonstrations, quiz shows, interviews, panels, and free-for-all discussion. Seniors produced almost all of the materials needed for the presentations (including contacting the guests, assembling the props, going out with staff technicians to videotape local events and answers and briefing local officials). Even though some of these active elderly people were isolates in their seventies and eighties prior to undertaking the activities, they obviously were capable of adapting to the demands of interactive technology.

A large number of elderly people comprised the population that regularly came to the Reading neighborhood centers. They had begun, as of the period under observation, Jan. 1 to Dec. 31, 1976, to develop a new communication code, or set of special behaviors, appropriate to the enhancements and constraints represented by the IATV environment in Reading. One example is "getting the floor." The key to being recognized was to obtain, and show that one had, a microphone. The intending participant signalled that he wanted to speak immediately, when the current speaker was finished, or whenever the Host felt was appropriate, by the manner in which the microphone was held and its distance from the mouth.

The Reading IATV code contained many other features. The point here is that it was developed as a human adaptation to technology by people using an IATV system to conduct affairs arising out of their needs and wishes. It demonstrated that ordinary people can adapt quickly and easily to the use of what is thought to be sophisticated communication technology. It is apparent that they had reason to want to communicate via the technology, that they were allowed to communicate as they wished to (including those instances when the subject matter was introduced by outsiders) and that the telecommunications system was made available for long enough sessions (two hours) at some frequency (five mornings a week) for a reasonable period (fourteen months*).

Technical adaptation to human communication requirements was extensive in the Reading system. The provision of as many as twenty-four live microphones made it easy for people to interact; it also required considerable experimentation with types of microphones and speakers, speaker positions, amplifiers and feedback suppressors, as well as acoustic damping of the physical spaces in order to permit a sufficient volume of sound while inhibiting the distressing out-of-phase resonance ("feedback"or "howl around") invited by live microphones interacting with loudspeakers.

In order to enable participants to see both who was speaking and whom spoken to, images of both were shown simultaneously side-by-side, on a split-screen.** This required phase-locking, i.e. delaying the video signals from all locations to match the time required for transmission of the signals from the most distant location.

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*Jan. 1976 – Feb. 1977 inclusive. The Reading system was continued through the initiative of its users after the experimental period. As of March 1978 it was still operational.

**The left half of the television screen shows, say, the speaker, and the right half the person being addressed, at another location.

Previous research conducted at the Andrus Gerontological Center at the University of Southern California showed that presbycusis, a hearing condition common to many elderly people, is characterized by difficulty in discriminating among sound frequencies in the middle of the normal hearing range. Consequently, audio outputs from interacting locations in the Reading system were adjusted to emphasize lower and somewhat higher frequencies, as well as to inhibit the transmission of mid-range frequencies.

None of these, or any of the other technical adjustments which were made to accommodate communication by users of the Reading system represented innovations in technology. They required some state-of-the-art research but were, in fact, practical implementations of current technical knowledge. They served to underline the axiom that "technology can do anything you want it to." This puts a premium on knowing what it is that you want.

1.7.2.7 Utility to non-technical users

The three systems, INTERACT, MRC–TV, and Reading, have exhibited varying degrees of utility, or ease of use. It would be unwise to generalize, but it is interesting to note possible correlation between style of camera operation and ease of use. Participants in Reading (many of whom are "regulars") use their system a bit more easily than do people at INTERACT (who are less frequent participants). Both, however, use their systems much more easily than do MRC–TV participants. The Reading and INTERACT systems both employ skilled camera operators who constantly watch the pictures being transmitted by their cameras, and constantly adjust them (pan, zoom, tilt, to follow action, single out speakers, etc.). The MRC–TV system employs, as noted above, clerical and other office workers who are detailed on an ad hoc basis to turn on the television equipment and to operate the cameras via remote controls. As often as not, this operation will consist of establishing a wide shot of the participants at a location and leaving the shot at that.

1.7.2.8 A comment about interactive television

It is not by accident that so much time has been spent in discussing this one mode of telecommunication. It enables simultaneous live transmission of sounds and pictures from and among all locations; thus, it imitates more of the conditions of face-to-face interaction than any other current mode of telecommunication. Interactive television captured a lion's share of attention and of dollars for experimental projects in the early years of the 1970's; thus, there have been more, and diverse, examples of interactive television to observe. Because interactive television explores all of the seeing and hearing options which other modes* utilize only singly or in lesser array, much of what can be observed about sound and picture transmission/reception in interactive television is applicable in some degree to the other modes.

However, fully interactive television is still difficult and relatively expensive to implement except between and among a few locations in any urban or regional setting, due to current transmission cost constraints. Technology may be able to do anything we want it to, but it simply is beyond the capacity of current IATV systems (including cable with its maximum of 40 channels that can be used for all purposes) to transmit video signals from a large number of individuals' homes or from more than a few institutional locations.

Realization of this basic constraint and the recognition that it will not be removed for a few years has latterly encouraged experimentation with the other modes (for example, one-way video with two-way audio; telephone conferencing and interactive radio; keyboard modes) in order to reach more people in homes and institutions. Inasmuch as severely-disabled people can often be involved only from home or institutional locations, these other modes cannot fail to occupy our attention, even if, at the moment, we find a smaller quantity of evidence to report about them.

1.7.3 Video one-way/audio two-way

In this mode all participants share a common source of live-motion video and each participating location can join the audio interaction. It would be possible to organize this mode around programming emanating from a television broadcasting station: the broadcaster would bring together a number of locations, including individuals' homes, in a simultaneous audio "pool," linked to the station by telephone lines or interactive radio, and mixed with the studio sound output. The audio interaction between broadcaster and participants as well as among participants would be heard by all. All would be seeing and referring to the same television pictures.

Use of broadcast television for this mode is not practicable for most social programs, though, simply because no television broadcasting station can afford to allocate the amount of air time required. Cable television, with multiple channels, may very well be able to afford considerable time to social programs. Closed-circuit systems and special frequency allocations such as ITFS** can also devote considerable time to social programs in this mode.

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* Always excepting keyboard modes, of course.

** Institutional Television Fixed Service, a television bandwidth especially assigned for use by public institutions. Most allocations in New York State are for education from elementary grades through high school.

Again, the field of health care has been the major developer of applications. The ATS-6 satellite telemedicine experiments in Alaska* from June 1974 to May 1975 utilized the video one-way, audio two-way mode in all transactions between four field clinics and the Alaska Native Medical Center in Anchorage. The field locations could transmit and receive both video and audio; Anchorage could receive video and audio but could transmit only audio. Thus patients and field professionals were seen by but could not see medical specialists in Anchorage. The specialists in Anchorage could remotely control cameras at the distant sites.

1.7.3.1 Sufficiency of picture and sound

Overall ratings by consultants and field professionals of "Adequacy of Signal Quality for Medical Purposes" of picture and sound combined assigned between 87 and 94% of all cases to either "satisfactory" or "excellent" ratings. On all tabulations, the numbers of cases assigned "excellent" ratings were far more than those named "satisfactory"; the ratios of "excellent" to "satisfactory" ratings fell between 2.2:1 and 34:1.

1.7.3.2 Reliability of transmission

Extreme cold was blamed for failure of video transmission from three of the field sites for periods of 14 days, 62 days, and 69 days, respectively, in the winter of 1974–75. Other than these three protracted periods, however, there was no failure of transmission. Whether extreme terrestrial cold will continue to be an inhibiting factor in satellite transmissions is unknown.

1.7.3.3 Human/technical adaptability

The capacity for adaptability and utility in the video one-way/audio two-way mode probably is little different from what has been observed in interactive television; however, there has not been as much evidence of adaptation in the former because there have been fewer one-way video systems and they have not been in use as long. The ATS-6 experiments occupied only 104 transmission days, but in that time they generated some information useful to planners about the expectation of users and the adaptations that came about in the pressure of events. In the first months of experiments, health care professionals declared (on a questionnaire) that in 30 to 60% of cases, the use of video was critical to the consultations. By the last month, the same professionals said that only in 3 to 5% of cases was the use of video critical.

In other words, had the health care professionals who were going to use the system been able to dictate the role that video was to play, their prior estimates would have placed an emphasis on video that was somewhat unwarranted in the long run. On the other hand, when video was needed, it was needed absolutely. The fact that the early estimate was too high by an order of magnitude did not mean that video should have been dispensed with. But when balanced against other evidence that video does not need to be of the highest quality, and that there is little if any enhancement of picture information even for medical purposes in the addition of color, it might seem there is not an absolute need to provide the most expensive video equipment.

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* See Foote, Parker, and Hudson (1976).

The adaptation that went on in this case was in discovering that sound alone provided most of what one needed to know, and in gaining security in the sufficiency of the information contained in audio.

Another adaptation to which the ATS–6 medical experimenters were led was the necessity for a high level of organization due to the serious time constraints (the satellite was available three times a week for an hour); the health care personnel would have preferred that the transmissions be available on demand. As it was, patients who turned up just after a transmission often had to be induced to return at the specific date and time of the next transmission; also, a great deal of advance coordination and preparation was required to make things function smoothly:

> The tasks ranged from contacting all sites prior to the transmission to determine what specialists were required at Anchorage and what records had to be pulled, to removing bandages from wounds, mounting x–rays and EKGs, etc. Without extremely dedicated participation of the small staff...the level of coordination required for successful operation of the project might never have been reached. (Foote, Parker, and Hudson (1976), p. 131.)

The inherent asymmetry in the video one-way/audio two-way mode created different reactions and different adaptations in the ATS–6 experiment from what was created in another satellite project named "Ironstar" which was to provide training for young natives in Alberta. In the ATS–6 setting, many patients seemed unwilling to talk on the microphone, and said in interviews that they did not understand who was watching them or why they were being presented. In addition, medical consultants often felt it was not necessary to talk directly to the patients; the local health care provider could present the case more efficiently. This probably helped to make the patients ill at ease, as they were conscious of being observed while the caring personnel discussed them in the third person.

In the "Ironstar" project, the tables were reversed: the one-way video showed the teachers and civil servants to the gatherings of young people in the native villages, but the latter were unseen. The young natives enjoyed the anonymity of this situation because they found they were capable of asking harder and tougher questions than they might have had their faces been shown.

1.7.3.4 Utility to non-technical users

In the remote situations where patients were presented, amenities were lacking in the best of times; the addition of technical equipment added to the space problems of cramped quarters. In addition, at first, the local health care providers had to adjust the cameras while presenting their patients; this was resolved by installing remote-control equipment (technical adaptation) that enabled the distant consultants at Anchorage to select the view they wished. There was a lack of privacy so acute that two of the clinics had to be closed while interactive sessions took place simply because there was no space in which to handle telemedicine patients and other patients at the same time. At another clinic, the resident physician had to defer much of his consultation with the Anchorage specialists until the patient had left the building, because there was nowhere to get out of the patient's hearing.

1.7.3.5 Comment on ATS-6

Most of the problems that arose from the rigid time constraints of the satellite schedule and the cramped quarters of the health stations remained through to the end of the project. The simple answer might seem to be that, in time, either the schedule would have been liberated somewhat and more space made available or that the participants would have made better adaptations to the conditions. There is the strong suspicion, however, that because the participants knew they were working in the framework of a closed-end experiment they assumed that nothing would be done and they had to make the best of it. It may not have occurred to them that adaptation was possible, even with the example before them of the shift in control of cameras. The point is, that this project demonstrated the futility of attempting to get valid research results from field experience which is not "the real thing" but only dabbles in actual experience on the pretext of establishing "facts" therein. The only experience that finally has anything to say to the planner looking for an answer to actual problems is experience that has been gained by people working in actual situations — which include the sure knowledge that the situation is indeed operational and is not going to go away. The perception of need for video had changed radically in the space of 104 days of transmission; what else might have occurred had the project gone on much longer, if it had been understood that it was a permanent aspect of the health care system? No one can say, because the options were numerous: the staff might have refused to continue unless the satellite transmissions were made available on a daily basis or they might have discovered better ways of organizing their time so as to obviate the need for expanded transmissions; during the experiment, participants had occasion to use the sound-only satellite ATS–1, and if they had been faced with a longer-term necessity of using satellites for consultation they might have developed protocols that rationalized division of cases between the two satellites rather than arbitrarily putting cases on whichever satellite had the next scheduled transmission.*

The experience of most ongoing, operational telecommunication projects has indicated that:

A. Participants' perceptions of what they can and cannot do change considerably at first, approach a steady state, but never stop changing.

B. Efficiency in system operation, likewise, increases quite rapidly to the extent that — in one well-monitored project — after a year and a half of continuous operation, it took one-half the original paid staff to accomplish more than twice as much work as the original staff had been able to do.**

C. To the extent that participants feel the project "belongs" to them (is organized to respond to their needs and wishes, and is open to change by them) they will make adaptations in their own behaviors toward better use of the telecommunication capacities and will make useful suggestions about adapting the technology to their needs.

D. The more that successful adaptations have been made, the greater the utility of the telecommunication system; if there is potentially a large number of participants this will tend to lead to a higher degree of utilization of the system and better spreading of costs.

E. Development of utility, through adaptation and greater efficiency, makes systems more attractive to other organizations and types of users; this has led to increased utilization of systems.

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*It must be noted that the ATS–6 telemedicine project was not the only one using satellites in this mode. Subsequent projects, notably those using the CTS satellite, have begun to report more satisfactory experiences.

** This was in the Reading, Pa. project. See Park (1978).

Only the first three of the above phenomena would seem to have been at all applicable to the ATS–6 project; all five are applicable to ongoing operational systems.

1.7.4 Video (still) one-way/audio two-way

This variation transmits still pictures during a transaction where participants can speak and hear each other. In most current uses, the still pictures are formed via slow-scan technology and both pictures and sound are transmitted over telephone lines. (Transmission could be done over-the-air via microwave, SCA, or other radio-frequency means, by laser or infrared light beams, or via cable or fiberoptic filaments; and the pictures could be formed by facsimile or frame-grabbing devices.) Slow-scan is able to use ordinary telephone circuits (or the other means noted) because it is transmitted a line of picture information at a time; thus, the better the picture one wants, the longer it will take to transmit it.* Transmission times run between eight seconds and ninety seconds; the short transmissions provide relatively sketchy pictures and are useful for graphics, handwriting, or identification photos; a ninety-second transmission can provide a high-resolution picture of a thousand lines of black-and-white information, such as an x–ray. (Color slow-scan is available, though not so widely used as black-and-white.) The means of viewing is a television screen, where each still picture may be held as long as wanted and then replaced by another. Current slow-scan devices can "store" four or five pictures that can be recalled by the viewer for comparison purposes; when the storage capacity is full, each new picture will replace the oldest picture in storage (although adaptations are now being made which will permit the viewer to select which picture is to be replaced).

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* A simple relationship among picture resolution, transmission time, and bandwidth decrees that for a given state of resolution, bandwidth and time vary inversely: the greater the bandwidth the less time is required, and the smaller the bandwidth the greater the time. Live television pictures are ordinarily of quite high resolution as a matter of course, because the bandwidth used for standard television is 4½ million hertz (4.5 MHz) of cycles per second. When pictures are sent on telephone circuits, they are traveling a bandwidth of 3 thousand hertz (3 KHz). It takes much longer for all the video information to be passed along this very narrow pathway than it takes for it to travel the broad highway of standard television. The two transmission modes are called "broadband" (for television capacity) and "narrowband" (for telephone capacity).

1.7.4.1 Sufficiency of picture and sound

By omitting motion, the still-picture transmissions succeed in operating over telephone circuits at very low cost, although there is a very wide range of costs associated with the initial investment in equipment. Where motion is not a factor, this mode of telecommunication already has become affordable to a wide range of users. The basic question is, of course, motion. Two recent telemedicine applications have forsaken motion for different reasons; but once one has concluded that motion is not needed there is little to discuss regarding sufficiency because the still pictures can be of the quality one desires, is willing to pay for, and is willing to wait for.

1.7.4.2 Reliability of transmission

The two telemedicine applications both use or have used telephone circuits, which have been reliable to date; however, the second of the two has yet — at the time of this writing — to experience its first winter in the Canadian north and that the microwave links in the circuits will remain reliable is not yet certain.

The first project was an experiment that linked a community hospital in Broken Bow, Nebraska, with the department of radiology at the University of Nebraska Medical Center in Omaha, 250 miles distant, in order to determine whether this was a satisfactory method for consulting radiologists to review the pictures.

The second project is an ongoing operational system that links a number of small mostly native villages (currently six, but soon expanding to nine, with the possibility of further growth), in northern Ontario, with physicians at Toronto General Hospital and Sunny Brook Veterans Hospital in Toronto for general and specialist consultation concerning health problems which cannot be disposed of by the local providers, who range from health aides to nurses and occasional visiting physicians.

1.7.4.3 Human/technical adaptability

The experimenters in the Nebraska system had the advantage of previous experience by radiologists working with x-rays transmitted in IATV settings, and knew they would have to examine the pictures in a regular, linear, left-to-right sequence in order to be able to call for closer views of specific areas. An area designated by coordinates on an overlaid grid could then be transmitted, magnifying the details as much as fifteen times.

The designers of the Ontario system had built very carefully from a well-planned series of experiments, from which they were able to select the ingredients that seemed most relevant to the solution of problems in remote health care to which they were directing their attention. (See Conrath, Buckingham, et al. (1975); Dunn, Conrath, et al. (1977); and Conrath, Dunn, et al. (1977). They concluded that visualization was needed enough of the time to warrant the provision of picture information, but that black-and-white was preferable to color (because of the high cost of color, its relative unreliability and need for constant attention by full-time technical staff, as well as the little additional value — if any — that was ascribed to color in the experimental phase by physicians) and that still pictures were preferable to motion pictures! This latter conclusion developed from careful experimental work where a small majority of physicians said that, for most diagnostic tasks, still pictures enabled closer examination without the distractions imposed by motion. When that preference was coupled with the much greater costs involved in installing and maintaining broadband television equipment and transmission, the system's organizers readily accepted the trade-off of lower cost against the occasional desirability of being able to see motion (such as when consultations were wanted in orthopedics, speech therapy, neurological disorders, and some aspects of psychiatry).

The consulting physicians in the Ontario system soon found that the arbitrary cancellation of the oldest picture by the newest in the slow-scan storage was not to their liking; the pictures they wanted to compare did not necessarily exclude the oldest one. It was their raising their objections that led to the manufacturer's modifying the equipment to enable dropping any stored picture in favor of the incoming new one.

1.7.4.4 Utility to non-technical users

Operation of the equipment, both slow-scan and audio, was not difficult; but, to the outstationed providers in the Ontario system, it contained elements of "strangeness." It is not, after all, a usual thing to carry on a dialogue with someone while referring to a still picture, particularly when one has to wait some moments for the picture to be available to the eyes of the distant party, when one must remember to point and focus the camera for the next transmission while discussing the latest one, and when the distant party may decide to return to a previous picture in the midst of the discussion. At first, this all made the village providers feel clumsy in the transactions and unable to perform to their own standards.

These difficulties in communication were alleviated by instituting regular sessions of informal discussion between local providers and some of the Toronto physicians with whom they had most frequent consultations. In this context, the village providers could learn to use the system in an ordinary social context. As they became acclimated to interacting in this more "normal" manner, the local providers gained confidence in using the system for professional tasks. Shortly, some of them also began to use the system to converse among themselves, to talk over common problems and share solutions, to establish collegial relationships, and — in the opinion of the system's co-founder and director — to make themselves more capable, more valuable members of the health community.

In describing and giving brief examples of the following four modes, no attempt is made to apply the criteria of sufficiency, reliability, adaptability, and utility.

1.7.5 Interactive radio

As noted previously, this mode encompasses citizens' band (CB) and amateur radio, but the type which holds most promise for organizational use is subsidiary communication authorization (SCA), which operates on the side-band frequencies characteristic of all FM (as well as of over-the-air television) transmissions. Thus, any locality which has FM stations broadcasting in it also has the potential of transmitting via SCA. SCA, unlike CB and amateur bands, is not available for transmission or reception by the general public; organizations must apply with the management of an FM station, to the Federal Communications Commission, for the authorization. Each FM sideband so authorized for use has a unique frequency which can be received only with equipment specially made for the purpose; this enables the using organization(s) to limit participation to a selected population. The communication characteristics are somewhat similar to those of conference telephone, such as the ETN system described earlier. Here, however, though all participants can hear, only one location can be speaking at a given time, and protocols need to be established so that it is understood who will "have the floor"; the new location must be switched in after the previous location is switched out. Although it is simple for anyone with the proper special receiver to hear proceedings, speaking locations require far more substantial equipment than is used for telephone network conferencing.

An outstanding example of an interactive radio network is that which operates from the Albany Medical College in Albany, New York. It is used for regular and special conferences among physicians and other professional groups whose participants are located throughout New York, New Jersey, and New England, with some interactions including locations in Pennsylvania and Ohio. The network is flexible as to the number and locations of interacting groups, adding additional SCA legs, as needed, to its home system that emanates from WAMC, Albany.

1.7.6 Computer-assisted instruction (CAI)

This is the only mode which does not facilitate direct interpersonal communication, but rather enables the learner to interact at a keyboard with the ideas of other people through programmed instruction to which access is given by a computer. The reason that CAI qualifies as telecommunication is because some applications are now interfaced with home terminals via community cable systems. One of the largest and best-organized is devoted to education of handicapped children in Buffalo, New York, and its environs. More than a hundred school-age severely-disabled homebound youngsters are able to take a large part of their schooling from lessons displayed on television screens in their own homes. Their lessons are organized on an individual basis with help of an education specialist who is both skilled in the use of computer-assisted instruction and well-informed as to the lessons and recreations available. Each student is able to proceed with her or his studies as rapidly as handicap, ability, and temperament permit. The Buffalo system, known as Tel-Catch, uses computerized education programs from a number of sources; the CAI programming industry is producing a wide variety of materials supplementary to education in the standard curriculum for all grades.

Teachers have noted a marked improvement in the education performances of the severely-disabled homebound children who are participating in the Tel-Catch program. One cannot fail to notice the enthusiasm with which they go at their lessons and the eagerness with which they explain the system to visitors. For several of them, the keyboard and television screen terminal has become a special asset in that it provides a common ground for contacts with schoolmates they might otherwise see very seldom. Neighborhood friends and classmates "come over" to play interactive games on the CAI system with the handicapped students.

The handicapped schoolchildren in Buffalo have no difficulty using the terminal keyboards and material displayed on their television screens.

1.7.7 Keyboards, conference mode

Teleconferences mediated by computers have no simple analog in a non-telecommunication context. Each conferee is able to log into the conference via a personal keyboard terminal coupled to an ordinary telephone, ask if there are any personal messages addressed to herself or himself, ask to see recent conference items that he/she has not seen, enter as many new items as time allows or inclination suggests, and go back over previous parts of the conference as wanted. The conference behaves li an extended dialogue with a certain amount of time delay between exchanges — although, on occasion, one engages in a "dialogue" with another person who is also sitting at her or his keyboard somewhere in the world. It is the ubiquitousness of telephone circuitry that enables this mode to function as it does, from any location with a telephone. The lightweight keyboard terminals now available, about the size of a smallish briefcase, also contribute to the facility with which one can participate in these teleconferences; it is now common for people to carry their terminals with them wherever they go so that they can log into the conference and enter their thoughts whenever they find a free moment. There is little time pressure; one can phrase one's ideas as precisely or as informally as one wishes.

Those who wish to learn about the world of computer conferencing should contact The Institute for the Future, 2740 Sand Hill Road, Menlo Park, Cal. (Robert Johansen, Kathleen Spangler or Jacques Vallee) or Computerized Conferencing and Communications Center, New Jersey Institute of Technology, Newark NJ (Roxanne Hiltz or Murray Turoff).

Teletypewriters for the deaf are another form of keyboard linked to telephone circuitry for transmission of printed messages among the large number of persons who currently form a nationwide network of users of this mode of telecommunication. Information about this mode and instruction as to how to join the nationwide network is available from Teletypewriters for the Deaf, Inc., PO Box 28322, Washington D.C. 20005.

1.7.8 Keyboards, access mode

Here again, as with CAI, interaction is between person and computer. The principal use of the mode in social service and health care has been for remote entry to client records and access to the information in the records. One of the most comprehensive systems is used by the Indian Health Service (IHS) in the Southwest and West. A very large and increasing number of members of the American Indian tribes who are clients of the IHS have complete and up-to-date medical histories in the computer-managed health files of the agency. These can be entered for information or new filing by authorized professional health workers from any telephone; the small transmitting/receiving keyboards carried by nurses, community health associates, and others, are similar to those used in conferencing via keyboards.

Chapter 2

Developing the Capacity To Plan: Involvement and Preparation

The previous chapter attempted to orient the planner to the kinds of responses that telecommunication might provide for communication problems in vocational rehabilitation. The characteristics of face-to-face environments were briefly reviewed because face-to-face communication is the genesis of our commonly-understood conceptions of what communication is. Over against the face-to-face tradition, the concept of telecommunication was proposed as an extension of traditional communication environments and behaviors. Client and professional communication factors were reviewed by the reader in terms of his or her own estimate of the conditions that characterize communication behaviors in vocational rehabilitation. The auditory and visual components transmitted by telecommunication were briefly reviewed, and communication capacities in various telecommunication technologies were compared. Finally, the bulk of the chapter was devoted to reviewing what previous experience in telecommunication has demonstrated, in order to give some clues about what may be the case when telecommunication is used to resolve problems and produce benefits in the field of vocational rehabilitation.

In this chapter, we will suggest how planners in vocational rehabilitation can begin to involve themselves and a group of colleagues and experts in understanding how the concept of telecommunication applies to communication in general and to rehabilitation communication in particular. The material to be covered is:

1. Salient planning factors in vocational rehabilitation
2. Criteria for forming a planning group
3. Grasping the concept of telecommunication through use of available systems
4. Assumptions underlying the use of telecommunication
5. Involving the planning group through use of test scenarios.

2.1 Salient planning factors in vocational rehabilitation

This is a set of projections with which VR planners are familiar. The components are defined in the context of the need to keep current with needs and solutions and to interact with the future, or a combination of futures. Process is stressed over product because it is participation in the process that provides participants with learning, understanding, and a fundamental grasp of possibilities.

A. Shifts in Decision-making processes. (One of the most significant aspects is the demand by handicapped people that they have a greater role in decisions affecting their needs. Lines of communication and information become more important.)

B. Shifts in Priorities. (e.g., the percentage of severely-disabled clients is increasing relative to the overall client population. Because the severely-disabled are already mandated for first-priority treatment, there needs to be a consequent realignment of resources among client groups.)

C. Resource Availability. (Current experience shows a leveling off of overall resources rather than continuing growth. In real terms, this may mean diminishing resources because of inflation and growth of client population.)

D. Shifts in Goals. (e.g., quite apart from the fact that real number and relative proportions of severely-disabled clients are rising is the change in staff performance goals re the severely-disabled, such as case-finding, development of new types of services, and placement, including expanded opportunities for sheltered employment for those not able to work competitively.)

E. Shifts in Strategy. (e.g., increasing use of partnership arrangements with other programs to achieve comprehensive as well as specialized services and to maximize use of available resources and expertise through the linkage of services with those agencies that do them best. However, such strategy shifts are related to Shifts in Demand — which see, below.)

F. Shifts in Types of Services. (e.g., as deinstitutionalization is achieved, rehabilitation services in community-based centers must be expanded. This will serve further to disperse functioning of many rehabilitation counselors.)

G. Shifts in Demand for Service. (Much new demand comes from the handicapped themselves in times of increasing unemployment, as the handicapped have a higher unemployment rate than others. Additionally, new Federal and state legislation continues to place reliance on VR services — from the New York State Crime Victims' Compensation

Program, to the pending likelihood that Workmen's Compensation will bring a shift from a state to a national standard in administration, which will in turn promote increased demand for rehabilitation services.)

When there is the likelihood or desirability of incorporating a telecommunication innovation, it will represent a pervasive factor, i.e., it will appear — or ought to be considered — under each of the lettered heads above.

2.2 Criteria for forming a planning group

Behind the activity envisaged by the planning process is the assumption that it is to be supervised and administered somewhere in the VR Agency. Most State VR Agencies do not have Offices of Telecommunication. Once a serious move is made toward using telecommunication, it would seem that the Agency should form such an office. Consider:

- The planning and implementation of the first model project will entail several person-years of work. The lifetime of the project should be more than three years at minimum* and if it is successful it will continue.

- The reason for planning a Process Model is to enable the accomplishment of VR objectives in a telecommunication setting that will provide a wealth of experience to VR staff and clients so that they can become an informed nucleus for further planning. This means increased activity in the telecommunication area in future.

- Telecommunication, though organized for the use of people generally, is in its design, implementation, and management a highly specialized field involving advanced technology and systems. The specialized organizing and coordinating functions implicit in the VR Agency's involvement in telecommunications should be embedded organizationally so that they constitute a resource accessible where and when it is needed.

- Because telecommunication activity should begin with a single Process Model, it is rational to relate any new organizational entity to the project. The new office need be only as large as the needs of the project require. Further expansion of the office, if it occurs, will tend to follow further requirements.

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* We are suggesting throughout this study that any period of implementation should be a minimum of three years; planning prior to implementation of a first project can easily take a year.

2.2.1 Staff

Telecommunication staff, initially, can be one person, with these qualifications:

- A present employee of the Agency who knows its policies and working methods from a large perspective. This implies an employee from general administration or planning, preferably an employee who has moved from field work into more general areas of responsibility.
- The employee must be someone who enjoys the respect of top management and who is likely to be promoted upward in the Agency. It should be assumed the position will reach a high level.
- Previous experience in telecommunication is not a requirement, but the employee should be highly intelligent and capable of integrating knowledge of telecommunication with understanding of VR administration and programs.
- Employee should be skilled in presentation of general concepts and program details to people both inside and outside the agency. Explanation of telecommunication projects will be a major aspect of the job.

2.2.1.1 Placement of staff in the Agency

- Should be in a general area such as Planning or Administration. Advisors to this present study warned that the new office will stay where it is originally put; therefore care should be taken not to house it in an area with a relatively restricted mandate (such as staff training and development, for example).

2.2.1.2 Staff responsibilities

- Staff should be charged with full-time responsibility for supervision of telecommunication planning and implementation and for wide dissemination of information about them.
- Staff should formulate specific plans for involvement of other Agency personnel in planning activity; it would seem rational to plan earliest involvement for those persons most directly concerned with the substance that is to be dealt with in the initial Process Model.

- Director of Telecommunication (if that is an appropriate title for the initial staff member) should report to the superior indicated on the Agency's Table of Organization but should have ready access to higher and lower management and staff on a "For Information" basis.

- Telecommunication staff should have adequate budget to engage consultants, to travel, and to arrange for demonstrations of telecommunication for both Agency staff and people whom the Agency wants to involve in telecommunication planning and implementation.

- Telecommunication staff will have responsibility for forming a Planning Advisory Group, in consultation with Agency top management and consultants.

2.2.1.3 Other observations about Staff

- Staff will be involved in all activities, from policy formulation through planning to implementation. This underscores that its responsibility cannot be devoted to any one area but to all. The staff's role, in spite of an implicit premium on imagination, is basically administrative and supervisory. It does not seem likely or appropriate that the staff should, itself, be expected to contain and employ all the skills called for in the implementation of telecommunication. Telecommunication staff of the Agency eventually will be purchasing technology and services and supervising their development. Management and operation of telecommunication activities should not be Agency staff functions, but should be at a project level. Project managers should be telecommunication specialists and the bulk of project staffs recruited from local areas.

2.2.2 Consultants

- Telecommunication consultant(s) (technical and/or program) should be engaged in relation to the levels of expertise required (general telecommunications system, specific telecommunication modes). Remarks as to the need for continuity in the Planning Advisory Group, below, are relevant to consultants, as well.

- There are very few generalists among telecommunication consultants; thus, it is important to know and understand the biases of consultants and to make sure they are adequately balanced by competing biases held by Advisors or other consultants. This is simply to say that almost all consultants (and other telecommunication experts) began and for some time pursued their professional careers in one or another of the telecommunication fields (cable TV, telephone, computer-based networks, satellite technology, for example) and will tend to reflect the conceptual frames of that mode where they learned their business. More and more consultants are aware they cannot afford to be salesmen for particular modes, however, and you should discover widespread understanding of your need for candid and unbiased appraisal of all modes (including non-recommendation of any telecommunication mode).

2.2.3 Planning Advisory Group

The Planning Advisory Group (PAG) must be all things to all people but cannot be. Nevertheless, it must be broadly representative of the fields of telecommunication and vocational rehabilitation (as well as fields related to VR and potential partner-agencies and organizations).

The Advisory Group should represent both continuity and change. Some members should serve on a near-permanent basis; others should be brought in for their counsel on particular projects. One way is to set up the Planning Advisory Group as a permanent entity, and bring in project-oriented (or problem-oriented) advisors onto task forces related to specific projects.

The PAG's activities can serve to focus telecommunication for the Agency. What it does and the way it does it ought to utilize telecommunication as often and as diversely as possible, because its activities — involving broad representation from inside and outside the Agency — will tend to have a wider range of attention than is the case with routine matters. Use of telecommunication by the PAG and staff has greater consequences than this, however. (See below, 2.3 Grasping the concept of telecommunication through use of available systems.)

2.2.3.1 Membership in the PAG

- Agency staff needs to be broadly represented but without thereby too greatly swelling the ranks of the PAG. Can this be accomplished better than by including heads of departments and offices which contain the greatest number of program areas likely to be affected by telecommunication?

- Regional representation may be indicated because of the tendency of VR to be structured along regional lines (metropolitan areas, counties, independent geographical entities).

- Include people (if not already represented as above) who look across and out of the VR agency to cooperating agencies, potential partners in telecommunication activities, toward consolidation of similar functions within and without the Agency.

- Include a representative or representatives of federal agencies which deal with other state agencies besides VR, such as Rehabilitation Services Administration regional executives.

- For telecommunication representation, include officials of regulatory agencies, state and national (FCC, state Office of Telecommunications, cable television regulatory agency, etc.) industry groups (public broadcasting, cable television operators, telephone system, for example) as well as the telecommunication consultant(s) affiliated with the Agency.

- Most important, make sure that client groups and lower-echelon professional field staff are well-involved. Without representation that will be recognized as representative by these groups, the credibility of the PAG and the Agency's planning efforts, in general, will suffer among the people whose enthusiastic cooperation is most needed. Any state VR Agency knows who these representatives are most likely to be: the clients and lower-echelon professionals whose cogent criticism of Agency policies and practices is the most intelligent, best-informed and, probably, takes the greatest amount of time and effort to answer and deal with.

2.2.3.2 Functions of the PAG: Substantive

- The overarching job to be performed by the PAG for the Agency is assistance in the establishment of objectives and goals for using telecommunication in VR, along with expert advice as to the methods by which the objectives and goals may be attained. In order to get at the substance implicit in this set of larger tasks, the following questions need to be addressed on the one hand to VR representatives (staff, clients, federal people) and on the other hand to telecommunication representatives (regulatory, industry, consultative).

Questions to VR representatives (a suggested and partial list)

- What are the priorities? In services to clients, in staff training, in administration?

- What are the problems in dealing with priority tasks?

- How are priority tasks currently being performed? What are they costing in personnel time and money?

- Where are the gaps in service?

- What are the issues about which the Agency and its clients are most at odds? Is there any real desire to resolve the issues? Can they be resolved?

- What ought to be done that is not being done?

Questions to telecommunication representatives (suggested, partial)

- What factors need to be taken into account in arriving at a telecommunication response to a problem or need? Programmatic? Organizational? Budgetary? Regulatory? Technical?

- What specific responses can be made to the problems and needs stated by VR?

- What are the short-range decisions that need to be taken?

- What are the long-range tasks that need to be started?

- What are the potentials in the responses suggested? What kinds of benefits should accrue and to whom? What kinds of improvements, efficiencies, savings, utilization of scarce resources?

- What has the previous experience been? Is it likely to be repeated in the telecommunication response(s) suggested?

- What will it all cost? How can costs be cut? What are the tradeoffs in spending less? In spending more?

Questions to Both (suggested, partial; to be expanded by the PAG)

- What are the alternatives to telecommunication responses? What are the tradeoffs in adopting them?

- Alongside telecommunication responses, what are the other parts of the solutions? How do they and the telecommunication responses integrate with each other?

- What organizational changes will be generated by the telecommunication responses suggested? Can they be made without undue dislocation? Should they be made, regardless of a certain amount of dislocation? What constitutes an intolerable degree of change?

- How are all the questions above to be answered? Can they be answered during meetings of the PAG? Do they require additional time and effort by members of the PAG? Will they, can they give that time and effort? Will the questions then be firmly answered?

- Is there some way to approach answering the questions that is better than planning a specific telecommunication project? Bear in mind that the project is designed to a) Meet current pressing needs and problems b) Provide a Process Model in which additional questions can be practically addressed c) Give the VR enterprise a framework in which to educate a large and growing cadre of clients, professionals, and significant others about the uses of telecommunication, generate innovations in the use of telecommunication in VR.

Obviously the last question is a loaded one, because the author of this study does not feel there is a better way or indeed any way to answer the questions other than by the Agency's committing itself to a long-term program of involvement in telecommunication; and the first major goal of such a program of involvement must be the planning and implementation of a specific telecommunication project. But, this question still must be left to the Planning Advisory Group, and the Agency, because no one can anwer it for them.

2.2.3.3 Functions of the PAG: Methodological

- Concurrent with its other functions, the PAG must constantly train its members in each others' languages, concepts, and methods related to tasks at hand. Traditional means (selected readings, lecture-demonstrations) should be supplemented by exercises that partake of the capacities of telecommunication while at the same time they show and tell the reality of VR. For example, many meetings of Advisors should be convened at their own offices in teleconference modes (for example, audio-only telephone or interactive radio; video one-way and audio two-way from a telecommunication project).

- So long as agendas are limited to one or two items, carefully defined, interactive teleconferences can save a great deal of time and travel. For audio-only conferences, Advisors need only be at a telephone. They need not even be in their own offices; they can be at home or out of town.

- Reports from field to the PAG or by members of the PAG can utilize contemporary technology: a report on videotape or audiotape might demonstrate not only the substance of events but that the report was produced by handicapped people who had learned how to organize the substance in terms of technology.

2.3 Grasping the concept of telecommunications through use of available telecommunication systems

Using available telecommunication systems is a step along the road to developing a telecommunication capacity of one's own. A process model may be the desired object, but in learning how to plan for it, it makes good sense to immerse oneself in some telecommunication experience, and such experience is available anywhere today. The range of types of available telecommunication is narrower in some places than in others, but at least one type is available everywhere: telephone conferencing. With the telephone network of circuits at hand there also are visual and other auditory modes available, as discussed in the last chapter, and some of these are not very expensive, particularly when hardware other than the telephone company's is available.

The reason for using available telecommunication is straightforward and simple: to become acquainted with the concept of telecommunication. This includes, however, some new and different learnings for most people who have not been exposed to the concept. In addition to the multiple possibilities imbedded in the telephone circuitry, are the capacities that are being developed more and more by local cable systems as they implement two-way transmissions; some newer cable systems are able not only to link a number of locations together for interaction, but to confine one set of interactions to a particular area while enabling other areas to engage in different interactions. Planners should acquaint themselves with a small volume, Telecommunications for Vocational Rehabilitation: Volume II Accessing Systems (Zobrak, Paquette, O'Neill 1977) which is an up-to-date handbook of practical information including not only brief general descriptions of various types of systems but also a substantial listing of specific names and addresses of organizations and individuals throughout the United States who are involved in specific activities associated with telecommunication.

As suggested above, the natural place to begin using available telecommunication facilities is with the PAG. One of the early tasks of staff with regard to the activities of the PAG should be to arrange for their being conducted via some form of telecommunication that is locally available.

2.4 Assumptions underlying the use of telecommunication

The following assembly of assumptions is surely incomplete, because it is in the nature of assumptions that they tend to reflect patterns of current belief and that the more pervasive they are the more they sink into unconscious and unquestioning acceptance and use. The Planning Advisory Group will undoubtedly add more of its own assumptions. So, the following are listed principally for illustration of what informs the author's ideas and to challenge the imagination of the reader; it is not important that the list be exhaustive, but simply call attention to the enormous range of assumptions that can arise out of so fundamental a human activity as communication.

2.4.1 Planning based on telecommunication

A. The first assumption simply repeats what has been made patently obvious in all of the foregoing: a definition of telecommunication that reserves the word for interpersonal communication at a distance, accomplished by some electric or electronic means.

B. For the foreseeable future, any use of telecommunication as an alternative form of interpersonal communication in the vocational rehabilitation process represents an innovation, except in a few localities.

C. People do not undertake to use new telecommunication technology unless the experience provides them with personal satisfaction or gain. (Park 1977.)*

D. Telecommunication technology does nothing by itself. Its capacities for enabling and enhancing communication become evident only as people use it. It follows that, as people understand the technology and clarify what they want to communicate, they are able to use the technology for communication. (Park 1977.)*

E. Telecommunication innovations — and other innovations — gain adherents and become established to the extent they are supported by community leadership (without which they surely will fail). It follows that the wider the domain of the supportive leadership, the greater the community's participation in the innovation; the longer the time leadership maintains its interest, the greater the chances for establishing the innovation as a feature of the community's communication. (Park 1977.)*

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* These four postulates (C, D, E, F) derive from observation of activities of the Alternate Media Center in establishing community uses of cable television in the period 1971–1977.

F. Telecommunication uses of cable television must have the support and cooperation of the system's management, chiefly because they tend not only to require technological innovation but also because rate structures for such uses have neither been developed nor tested. Therefore, cable management must see these uses in terms of benefits and/or of fulfilling franchise or regulatory obligations. (Park 1977.)*

G. Unanticipated consequences will be among the most significant outcomes of any new communication system or new uses of old systems...such as new uses for the telephone. "In fact, the only thing predictable with certainty is that unpredicted use will be made of the system; i.e. that uses not planned for will be found for it once it has been installed." (Rockoff 1975.) Any system, however, must be in place long enough for participants to find the new uses.

2.4.2 Planning for the vocational rehabilitation process

A. Participants in the process — and therefore in planning — include staff at all levels, clients, and client family members and significant others (e.g. service vendors, potential employers, interested legislators).

B. Values to be taken into account are expressed in: Laws (e.g. PL 93–112); Policies (as formulated in regulations); Ethics (e.g. professional codes); Rewards (as delineated in tests of performance for staff, benefits for clients); Preferences (e.g. individuals' tastes and biases).

C. Priorities affecting planning are both near-term and long-range. They are principally determined by assessing the relative weights and pressures in: Goals (such as performance goals regarding severely-disabled clients — outreach and case-finding, new services); Demand for services (such as those brought about by rising numbers of applicants, by new federal and state programs such as deinstitutionalization and assistance for crime victims); Resources (both human and fiscal — currently under strong competition from other needs such as energy, environment, and income security).

D. Innovations, such as use of telecommunication, should be taken up under the heading of Alternative Methods, in a mix with Needs, Available Resources, and Current Arrangements. Generally, Alternative Methods are not selected unless Current Arrangements are judged incapable of meeting assigned objectives.

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* These four postulates (C, D, E, F) derive from observation of activities of the Alternate Media Center in establishing community uses of cable television in the period 1971–1977.

E. Scope, sequence, and duration of planning — where innovation is involved — should include provisions for: trialability (division of the innovation(s) by phased goals); feedback and modification; and clearly-delimited objectives.*

F. Definition of risk in plans involving telecommunication will be difficult because of the dearth not only of data but also of reliable interpretations of the small amount of data available. This situation is not improved by the observation that telecommunication innovations seem to have a fairly long innovation-decision period**, which means that planners must be prepared to live with the telecommunication innovation decision for some time. (Even under the trialability provision indicated in E., above, the first phase should be long enough to permit a decision as to whether staff, clients, and others want to use the innovation; and this must allow time for technological debugging and adjustment, trial-and-error by users, and achieving a reasonably steady state of use. Unfortunately, many projects have not allowed time.)

G. Technological innovations which are as potentially widely-used and influential as telecommunication alternatives to face-to-face transactions require availability of special expertise. Whether on a staff or consultancy basis, advanced telecommunication knowledge must be available from the planning stage through implementation. Such expertise will embrace both technology and human communication, normally will involve persons in both areas, and will require time commitments proportional to the scope and duration of the projected telecommunication implementation.

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* Note, however, the clear warning (in 2.4.1 G., above) that unanticipated (unpredicted and unplanned) consequences can be expected when telecommunications innovations are the subject. Therefore, it is not only necessary to have clear objectives, but to be prepared to see them overshadowed or requiring some subsequent modification. A relevant case: The primary objective in the recent interactive cable television experiment in Reading, Pa. was to bring older people together with providers of services (cash and in-kind benefits, human development, municipal services). This objective was accomplished, but only after another benefit had been achieved, and in the context of the prior benefit — greatly-increased social contacts by elderly people with each other, which achieved relief of varying degrees of isolation, led to higher activity levels among elderly participants, and produced a system of self-referrals among the elderly.

** Innovation-decision period is defined (by Rogers and Shoemaker 1971) as the length of time between first learning of the planned innovation and adoption or rejection of it.

2.4.3 Planning that incorporates innovation

A. Innovations invariably meet resistance. The more sweeping the innovation, the greater the resistance. (McNeill 1957; Bird et al. 1971.)

B. There must be perception of need for the innovation, and need cannot be defined solely in terms of the improvement(s) or efficiencies wrought by the innovation. (Carey 1977a; Bird et al. 1971; Park 1974.)

C. Innovation will not be accepted simply because it helps to do the job better, nor do organizations and individuals constantly search for the best way. "New departures take place only when existing practices are found completely unsatisfactory." (Murphy 1976.)

D. Innovation implies concepts, technologies, and methods unknown to the persons who will be affected by it. Therefore, planning which incorporates innovation requires the services of "change agents" to operate in the planning process as well as in the implementation of the plans. (Rogers 1962.)

E. The more recent the innovation — or the less its previous diffusion — the slower is its rate of adoption. "The trial-to-adoption period is longer for relatively earlier adopters than for later adopters." (Rogers 1962.) "The more innovative individuals have no precedent to follow at the time they adopt, while the later adopters are surrounded by peers who have already adopted the innovation." (Rogers and Shoemaker 1971.) For potential users this means that it is easier and less costly to follow than to lead. In the private sector, the deciding factor may be a loss or gain of market share. In the public sector, we have similar kinds of situations, generally in the framework of a fixed budget. Therefore, new earmarked resources must be provided if innovation is to proceed.

F. One way to help ensure proper understanding of innovation is to include the change agent within the planning organization. Such a unit should be near the top of the hierarchy power structure. (Rogers and Shoemaker 1971.)

2.4.4 General

A. Contemporary societal issues are best considered from the post-industrial point of view: that society is a system of sub-systems, in which telecommunication and computer science service the communication/information requirements of systemic networks down to the smallest unit — the individual. (Ackoff 1974.)

B. Planning attempts to project needs some distance into the future and match them against responses then available. In practice, this means matching the strongest emerging needs against new and workable responses becoming available today. (NYU-Reading Consortium 1974.)

C. Planning is predicated on acceptance and utilization of its products by individuals, therefore the individuals who will be involved with the products of plans should be involved with the making of plans; and involvement often leads to commitment. (Ackoff 1974; Baer, Johnson, and Merrow 1976; Rogers and Shoemaker 1971.)

2.5 Involving the planning group through use of test scenarios

Test scenarios represent a context for particularizing and evaluating alernatives, applying organizational values and styles (for example, Laws, Policies, Ethics, Rewards, Preferences) to new and different situations. They also bring resistances to the ideas of change to the surface at an early stage in the planning process. The aim is to begin to understand the factors in VR which directly affect and are affected by the incorporation of telecommunication.

Inasmuch as test scenarios are primarily diagnostic (helping to learn the attitudes, potential conflicts, likes and dislikes of the members of the planning group, as well as demonstrating specifically how sub-groups will form around certain issues, and then re-form differently around other ones) they only represent a starting-point for considering possible future applications of telecommunication in VR. Once the test scenarios have been used and have helped to show up agreements and disagreements, likes and dislikes, difficulties and opportunities, in other words: profitable and unprofitable avenues of approach, it will be simpler and easier to go at the job of making specific plans.

The following test scenarios are purely illustrative; they may have some specific value for you if your concerns are the same as those that motivated these scenarios. But they are only models; the telecommunication staff should construct scenarios particular to your situation, your problems and possible telecommunication solutions to them.

2.5.1 Test Scenario #1

This scenario is based on information from a New York City rehabilitation agency, which provides many of its homebound clients with bench assembly work that they do in their own homes. According to personnel of the agency, communication of new work routines:

- Must rely on telephone and drawings, schematics, etc. and this is not helpful to many clients.
- Clients learn visually. (Visual cueing.) Without visual capacity, training becomes difficult.
- Best training is individualized. Mass teaching is not successful.
- Need for visual feedback, not just visualization of the process by the trainer, to see if client is doing the work correctly. (If not, they often get back two weeks' worth of useless work.)

Preliminary Planning

1. A number, say 40, of handicapped workers doing homework must be trained to make a new item none of them has made before. Previous experience shows it to be the kind of item many workers will execute incorrectly after the usual mailing of schematics and telephone discussions.

   The agency's production cadre feels that training to make the item must include a visual component. What might be a telecommunications response to the problem?

2. One response could consist of the following elements and actions:

   A. During a one-hour live session, the production trainer from the agency demonstrates the making of a new product to an actual home-worker. This demonstration is done in a cable TV studio and is transmitted on the cable. The interaction between the trainer and trainee is spontaneous. Cameras and microphones report what is taking place.

   B. Thirty to forty of the agency's homework clients watch the demonstration at home on their own TV sets. (Those who do not have TV sets are provided with them.) Ten of these clients are connected with the television studio by a telephonic conference call which enables them both to ask questions and to respond to questions put to them by the production trainer. They are on an open line; they can talk at will and be heard by each other and on television. (The total group of homework clients has been assigned to watch the TV demonstration and the group on the conference telephone interconnect has been selected for its representativeness by the trainer.)

C. In addition to the information supplied on television, all of the at-home participants have the correctly assembled item and some multiple of the total component parts comprising it. They follow along with the trainer and their colleague in the studio in making the proper layout of parts and then in assembling a number of the items correctly and in correct sequence.

D. A fairly large part of the time is spent in repeating the assembly sequence so as to establish it firmly as well as to determine whether any difficulties arise in the context of repeated work.

E. A printed work-text also has been sent to participants. This exactly replicates the layout and assembly sequence which are taught during the session. This supplementary material not only serves to provide reinforcement support after the televised sessions; it also is used during the session itself so that the points made on the TV session are directly related to pictures and text. Minor corrections or improvements in layout or assembly techniques made during the session can be entered on these sheets at the time.

3. Questions and Criticisms

A. Questions

1) What does this telecommunication alternative cost?

- Agency staff preparation time.
- Television studio time. (Assume transmission is free: either municipal or education channel on the cable.)
- Printing and mailing supplementary materials.
- Telephone conference charges.
- TV and telephone service for clients not previously possessing them.

- Transportation for one client and trainer to cable television studio.

2) What would comparable face-to-face instruction cost? (In homes.)

- Agency staff training time and travel time

- Printing supplementary materials

- Transportation to and from forty clients' homes.

3) Assuming an equal training achievement, what other benefits associate with the telecommunication alternative and face-to-face instruction?

- Face-to-face includes: personal contacts with clients; opportunity for trainer to deal with specific details of each client's home environment and work-space.

- Telecommunication includes: all clients see a member of their group dealing with what are to them familiar problems; opportunity for all clients to hear (and some to interact with) a number of other clients on the basis of mutual questions and concerns.

4) What questions need to be answered before considering trial implementation? (What constitutes an adequate feasibility study?)

5) If it is feasible — can this sort of idea be carried a step further: shortening the previous course of evaluation and training at the agency and substituting TV training of this sort? Would this be a viable idea for all clients or only those to whom the entire 16 weeks of evaluation/training is onerous?

6) Does this telecommunication application seem likely to be able to accomplish the training objectives? Which aspects of training remain in doubt? (For example: inability of trainer actually to see clients' work-spaces, setups, and actual work.) Can these uncertainties — if they exist — be resolved? How? (For example: by a routine of careful questioning? by the use of

"catch" questions which can only be answered correctly if set-up and sequence are correct?)

7) Does this kind of telecommunication application integrate well with other applications? (For example: does this sort of application lend itself to other client needs, or to training of VR personnel?)

8) How far does this sort of application go in responding to clients' needs for socializing?

9) How frequently would it be desirable for clients to participate in such telecommunication? For training purposes? For socializing?

10) What likely variations on the idea might be suggested? (For example, watching a pre-recorded program and then discussing it in a series of telephone conferences. Note tradeoffs: inability to show a visual response to participant questions; lower costs?)

B. Criticisms (Are they valid? What do Advisors say?)

1) Seems like a very inefficient use of the limited resource use of a TV broadcast channel: forty persons served.

2) Does this sort of thing lead to increased isolation of the homebound by depriving them of face-to-face contact?

3) Exposure of a disabled person's handicaps on open-circuit television.

4) There is no assurance that all the clients who should particpate will participate, and the ones who need it the most may very well be the ones who won't participate.

5) (Yours)

2.5.2 Test Scenario #2

This is based on our impressions about a vicious circle which seems to characterize the experience of many homebound severely-disabled people:

- They tend to dwell outside the mainstream of life in their neighborhoods and communities. Consequently they have rather limited life-experience. In addition to negatively affecting a wide range of cognitive and social factors, limitation of experience is held to be both physically and mentally debilitating, thereby increasing needs for medical intervention and institutional care. See Rossman and Clarke 1965.)

- They have no information or models to show them how disabled people have succeeded in overcoming their handicaps or how disabled people can work in spite of their handicaps.
- They are ill-informed as to how to go about seeking opportunities for education and employment.
- They are ill-informed as to their chances of being admitted to programs of vocational rehabilitation and training.
- They are ill-informed as to their entitlements to programs of financial support and medical assistance.
- They are effectively stigmatized both by their disabilities and by their low levels of intellectual and social skills. Among other things this contributes to low self-esteem and causes them to stay outside the mainstream of life, thus restarting and re-enforcing the vicious circle.

Preliminary Planning

1. The goals and objectives to be pursued in ameliorating the implicit problems and needs here are:

    A. To bring substantial numbers of handicapped people into situations where they can see and hear, as well as participate in, discussions and other exercises where the problems and entitlements of handicapped people are the focus of interest.

    B. To endow such situations with both candor and clarity. In other words, to avoid minimizing problems of the handicapped and to use plain understandable language.

    C. To expose the actual desires and questions of handicapped people to expert resource-people and authoritative answers.

    D. To start or assist a process wherein handicapped people can become less isolated and more integrated in ordinary society both vocationally and socially.

2. One possible telecommunications response could be a regular series of sessions using cable television capabilities.

   A. The sessions would be based on audio-visual interaction between two locations on any one day. The two locations could be different each week, however, by rotating among a number of locations.

   B. Technically, sessions would be conducted on a single cable channel on a serial basis. In other words, one originating location would be seen at a time but both locations could be heard at all times. People at the originating locations and at home would see the same picture and hear the same audio.

   C. Sessions would be organized by handicapped people. (The idea would be firmly established that handicapped people are in charge of selecting what happens, who is invited to participate, and thus that they would exercise considerable control over substance as well as style of sessions.)

3. The "programming"objectives would be broad:

   A. To enable quite ordinary as well as gifted handicapped people who are involved in mainstream activities to describe their experiences and to answer questions put to them by both handicapped and "normal" people.

   B. To present various alternatives in which handicapped people who are engaged in work which is sheltered, institutionally-oriented, or done at home, to describe their experiences and express their feelings as to how these activities can be improved for their benefit.

   C. To enable a wide range of people — handicapped and not — to discuss a wide range of social, medical and economic concerns of the handicapped.

   D. To enable handicapped and normal people to enjoy mutual pleasant activities such as singing, exchanging recipes, reading favorite stories and poems, and reminiscing.

   E. To provide a ready forum for the giving and receiving of information about vocational and recreational programs for the handicapped, entitlements in aid, and other pertinent material. Representatives of government and non-profit agencies and institutions would be invited to participate.

4. These sessions would be available to any subscriber on the cable system, but obviously promotion and publicity would be directed toward handicapped people and their families as well as professionals and volunteers concerned with the welfare of the handicapped.

5. Telephone call-in interaction would be encouraged. Callers' voices would be heard raising questions or making comments. The implication is that most sessions would present material of such interest to handicapped people that it would stimulate questions and comments.

6. If desired, the series of sessions could generate a mailing list which would enable sending out to regular program viewers supplementary learning materials (for education sessions), various forms (such as Medicare/Medicaid, tax rebate forms, Social Security earnings declarations, etc.) and information assessed as interesting or valuable.

7. In sum, this would be a magazine-type of programming utilizing a limited form of interactive cable television and subscriber telephone call-ins directed at and under the control of handicapped people.

8. Questions and Criticisms

   A. Questions (some possible ones)

      1) What are the costs?

      - Staff (part paid, part volunteer?)

      - Television studio time

      - Cable transmission time

      - Office and operating costs

      2) Whose auspices?

      - OVR? Mayor's Office of the Handicapped?

      3) Who would provide funds?

      - Is there any way such a scheme could become self-supporting?

      4) What constitutes an adequate feasibility study for determining whether this idea should be tried or implemented?

      5) How will this sort of concept accomplish its objectives?

      6) Does this concept integrate well with other telecommunication applications?

7) Can disabled people be seen as a cohesive enough group to participate in such a project? Can such a project help bring about cohesion among people with different sorts of disabilities?

8) What other activities (of a non-telecommunications nature) might such a project stimulate?

B. Criticisms (Are they valid?)

1) Disabled people may not be willing to devote time and effort to such a project.

2) Professional service providers would not support such a project because it would take too much time away from their work.

3) Exposure of disabled people on open-circuit television.

4) Likelihood that such a project will only succeed in making people more homebound because they have to sit at home and watch television.

5) (Yours)

2.5.3 Summary

Both these test scenarios are submitted in unfinished, preliminary forms. A number of questions are now raised about each and a few criticisms have been levelled at each.

The criticisms are typical.

We need you to respond to scenarios like this as follows:

1. What other questions would you want considered?

2. What answers or responses do you have to the questions?

3. Even though these two test scenarios are intended at this stage as diagnostic devices, not actual suggestions, do you think that any aspect of either one has specific merit, or represents the germ of a fruitful idea? How and why?

4. Do you agree or disagree with the criticisms?

5. What improvements can you suggest to either scenario?
6. What obstacles and dangers can you see?
7. Do you know of any projects like these?
8. How do you feel about these sorts of ideas, personally?

(The above questions can serve as the basis for small group discussion, written questionnaire, or a teleconference.)

That is the end of the two sample test scenarios and of this chapter. In the next chapter we direct our attention to the specific targets that must be addressed on the way to developing your own telecommunication program in vocational rehabilitation.

Chapter 3

Selecting Targets for Telecommunication

If the VR Agency wants to develop a telecommunication Process Model, or if it simply wants to take its first major step into using telecommunication, there are two major questions it needs to answer:

What should be the first application of telecommunication?
How should the question of cost be approached?

The question of the first application may be extremely sensitive. Surely, whatever is done first on anything like a major scale will very likely produce some important effects (including possibly, an antipathy to ever using telecommunication again). The planner probably is not at a loss for suggestions as to uses of telecommunication; on the contrary, it is likely that everything the agency does has been suggested at some time or another, by someone, as a candidate for supplementation or improvement. But to which of these should telecommunication be addressed? The following approach suggests an answer that grows directly out of the assumptions in the last chapter.

3.1 Coping with the most severe contingency. Alternatively, selecting a non-sensitive peripheral activity.

This approach projects a strategy for unifying the planning participants and minimizing resistance to innovation by focusing on the problem which the majority will agree is most in need of solution.

Here we will use as an example (representing the most difficult problem for VR in New York, as well as other states) the homebound disabled individual.

As noted by Rusalem (1967; 1971 ?*), it was not until the beginning of the present decade that the homebound were seriously regarded as clients for vocational rehabilitation, at all. Today, it is widely recognized that homebound disabled persons have as much right to the potential benefits of vocational rehabilitation as anyone else. The decade of the 70's has witnessed the growth of comprehensive and coordinated programs for the rehabilitation of the homebound, and as the decade draws to a close, these efforts have succeeded in rehabilitating significant numbers of homebound people and demonstrated that the clients themselves were determined and able to change their life conditions.

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* The reference, "Exploring the Widening Circle: Recent Developments in the Rehabilitation of Homebound Persons" is an undated mimeograph which says at one point, "As 1971 dawns ... one senses that the rehabilitation movement is abandoning its long-standing detachment from the homebound."

In spite of all this, rehabilitation of the homebound remains a difficult and frustrating problem, the essence of which is homeboundedness itself. The homebound person and her or his professional helpers face considerable problems, including the following:

A. Lack of adequate transportation for the homebound person. This probably constitutes the single most serious barrier to rehabilitation of the homebound.

B. Isolation (infrequent social contact, inactivity, narrow range of stimulation) is common to homebound people; it can result in severe psychological, social, and physical deteriorations.

C. Services in the home must be individualized, requiring the skills of multiple providers.

D. Architectural barriers still constitute denial of access by severely disabled people to many places, in spite of progress in laws and practices.

E. Rising unemployment rates affect the rehabilitated homebound person more severely than most.

F. Inflation, plus diminishing funds for rehabilitation, conspire to limit the growth of services needed to assist the homebound.

The six problems above are typical, and do not exhaust the reservoir of difficulties faced by the homebound. They are sufficient, however, to suggest telecommunication alternatives that might be both helpful and non-threatening to clients and providers:

A. Interactive telecommunication could provide a substitute for some transportation. Teachers and students, counselors and clients, could engage in the communication transactions involved in some educational, guidance, and social activities without leaving their respective homes and/or work places.

B. Contrary to the isolation effects ordinarily risked by homebound persons, telecommunication to and from homes could involve considerable social contact, activity, and stimulation.

C. Services provided in the home by telecommunication would often but not always be on a group basis.* In any event, good and efficient use can be made of the scarce resources represented by counselors and teachers who deal with multiple clients and eliminate travel time; these arrangements can be made in synchronous or delayed time (see Table 3 above), on a simultaneous, sequential, or shared basis.**

D. Although architectural and other physical barriers are not removed by telecommunication, the shared experiences of formerly homebound people in eliminating some barriers and circumventing those that remain can be helpful both to less-advanced homebound people and in spreading information about barrier-removal to places where it can be put to good effect.***

E. Opportunities for homebound persons to engage in more sophisticated employment, at home, are increased by the use of telecommunication. (See Shworles 1970.)

The above brief example represents a situation where telecommunication alternatives may help to overcome some problems so difficult to resolve that, in many cases, they are not being resolved at all: such overwhelming communication needs lay behind successful implementation of health-care telecommunication in rural and remote areas of the United States and Canada, the provision of better education throughout Wisconsin via conference telephone, the experiment involving two-way cable to serve the needs and wishes of elderly people in Reading, Pennsylvania, and computer-assisted instruction for homebound handicapped people in Buffalo, New York.

It may be hypothesized that the successful implementations of telecommunication in situations where they were addressed to crucial unmet needs are necessary precursors to wider implementations where telecommunication would bring about greater efficiencies, enable existing objectives to be met more easily, and provide previously unknown but subsequently valuable new services in areas which were suffering from less-crucial problems.

In the section of Assumptions in Chapter 2, the most formidable is the one which says that innovations invariably meet

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* Live interactions involving video will tend to be used best for groups in the foreseeable future. Audio interactions, as well, benefit from group participation. Transmitting/receiving keyboards are useful for both groups and dyads.

** Simultaneous: all members of a group are involved at once. Sequential: members are involved one at a time. Shared: members are involved one at a time — at the same time. (This is characteristic of delayed-time applications such as keyboards.)

*** For example, theaters can remove a number of aisle seats, to be replaced by wheelchairs — or ordinary chairs, if not sold to disabled persons.

resistance to change. What this means is that the very people for whom a telecommunication application is to be planned and who should be doing the planning are inherently opposed to it. It belongs to a class of experience — change — in which they do not wish to be engaged.

Another group of assumptions says that telecommunication can provide the communications in many essential services and can provide these communications at distances and/or in locations where it otherwise is difficult or impossible to provide them. In other words, regardless of the resistance which the telecommunication innovation evokes, such resistance cannot make the contention that the innovation cannot provide the essential communications it is designed to provide.

We are encouraged to believe that resistance to the idea of change through use of telecommunications, though it is real, is based to a great extent on ignorance. Therefore, if ignorance is dispelled, resistance to consideration and use of telecommunications should be reduced. Critical judgment will remain, however, to be brought to bear on the actual operation of the telecommunications, and on the values and benefits to be expected from their use.

When we propose to use telecommunication to relieve a set of human needs made crucial because they are extremely difficult or impossible to meet, we will probably encounter less resistance to the innovation than if we proposed to address a need already being served.

The most intractable need, for New York State's office of Vocational Rehabilitation, is to provide a full range of services to homebound persons, and they constitute a group to which planning must give very high priority. The homebound are isolated from training and other services, from social relationships, from the opportunity to work — in short, from all the things they most need and desire.

Telecommunication can provide responses to some of the needs — training and other services, social relationships, a work place — experienced by homebound people. The telecommunication experiments in Alaska, rural Maine, Buffalo, New York, and Reading, Pennsylvania have made very satisfactory responses to these kinds of needs.

Telecommunication responses to the needs of the homebound would serve both to help alleviate some of those needs and to bring a number of professional and significant other persons into a working relationship involving telecommunications innovations. They would be engaged in a context where systematic telecommunication responses were being employed. In the context of such an actual helping application, ignorance, a major support of resistance, would be eroded. This context would encourage and stimulate the thinking of the people who are concerned with planning what other applications might be made of telecommunication.

A telecommunication response to a crucial set of needs, such as those of the homebound, can thus become an acceptable starting-point for further innovations. It becomes a test-bed in which the participants are pioneers not guinea pigs; in which services to the real needs of real people and other benefits emerge in both planned and unanticipated ways; in which people begin to learn how to use the extended human communications in new environments made possible by carefully-designed technology.

Planners must, of course, consider also the conditions under which the targeted service currently is being delivered. What are the costs involved? If the service — no matter how much effort has been put into solving its problems — is not being delivered or being delivered very poorly, then the costs either are nothing or excessively high. If high costs represent real, budgeted dollars, then there either is money to explore new alternatives or there may be, as suggested by Lucas, below, a great deal of built-in resistance to change, even though a high-priority mandate is not being met.

Planners know that any telecommunication solution is not the total solution, and will ask: What are the other parts of the solution? (Some aspects of "other parts" may, however, be spurred by the telecommunication. In Peoria, the severely-disabled homebound clients who had met each other via interactive television and left their individual isolations when the project was terminated in order to go to lunch together had made an effort that probably would not have suggested itself without the kind of impetus that the telecommunication afforded.) The other parts will include organizational functions and tasks, which should be changed by the impact of the telecommunications.

There is a good deal of evidence that the criterion of high-priority unmet needs is valid. In telemedicine it has been observed that successful applications were related to situations where primary health care and basic specialty services were unavailable or very difficult to obtain. Telecommunications were the means by which long-lived applications were begun in these situations:

- No medical service at Logan Airport, Boston. An airline disaster prompted the initiation of telemedicine service from Massachusetts General Hospital in 1968.
- No psychiatric care in a small New Hampshire town. Newly-released mental patients required that it start in 1968.

- No physicians on a small well-populated island off the coast of Maine to which access can be difficult in all seasons, but especially in winter. Telecommunication has been used to provide consultation to a nurse on the island since 1973.

- Few health-care professionals throughout the Canadian North and most of Alaska. Two-way radio has been used since the 1950's; several attempts have been made to use one-way video, two-way audio via satellite, 1975–1977.

- Lack of both specialist service and continuing medical education in Veterans Administration Hospitals. This has been offset, in large part, by telemedicine links of all kinds, since 1967. Increasing numbers of VA hospitals are being equipped for telecommunication.

- Lack of physicians in several Boston nursing homes. This was countered by visiting city nurses who can get immediate telephone consults from on-station physician at Boston City Hospital, since 1973.

Lucas* looks at the criteria from a different perspective. He agrees on the value of using a single approach, but says:

> Most projects set out to find, not unmet needs, but unfulfilled service activities, gaps in the service matrix, because that's where the least organizational resistance is. It's easiest to get the rest of what is needed (and the organizational changes that may be required) if you put them together on the margin, at the periphery, in a new service area. That's where it's simplest to beat the bureaucratic and political problems of change. On the other hand because it is at the margin, it's the first thing to get eliminated when money dries up or gets tight. It is harder to get (telecommunication) implementation in an ongoing major priority area. The bureaucratic battles are intense, people resist change, you're dealing with more organizational problems, regulations, etc. However, if you are, in the rare event, successful in getting implementation you almost always get institutionalization and a permanent project.
>
> So ... you very often have to make the choice between low hope for implementation but very high hope for institutionalization; and very high hope for implementation but high risk at institutionalization, in the long term. That's a tradeoff. Projects in the past have, with great consistency, gone for the easy implementation, because that's what you can promise the Feds, among other things. As a result, you have this graveyard, scattered from coast to coast, of projects that didn't last beyond three or four years, when the Federal R and D money disappeared.

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* William A. Lucas, member of the Advisory Committee to this study, and author or co-author of several relevant works in the area of serving social needs by telecommunications.

3.2 How to think about costs

The honest telecommunication consultant can only give cold comfort to the administrator who has turned toward telecommunications as a possible answer to his problems and whose first question — prudently, wisely, correctly, he thinks, is "What is it going to cost?" Because the consultant must answer, "I don't know." Even if the question is put another way: "What can you give me for a half-million dollars?" the answer must be the same. Until we know what is to be communicated, by and to whom, in what numbers, over what distances, in what locations, using what technology and what transmission system, for how long, we will not know capital and start-up costs; and next, we must determine staffing, accommodations, and the rest of it.

The question is to be answered, of course. Later. After the problems which the technology may be able to resolve have been analyzed and responded to, in functional terms.

In the most general way, we first must ask whether the Agency program(s) being considered has (have) resources of its (their) own with which to embark on new ventures, whether resources may have to be diverted from other programs, or whether anything new will require new resources. This exercise is intended to alert planners and administrators to the direction and smoothness of the road ahead, to begin to take the preliminary actions that seem indicated.

Administrators must have declared the "ball–park" in which costs must fall. At some point, the planners will have narrowed their focus to a particular program area, with its client/professional mix, range of objectives, and characteristic program goals; they have selected a telecommunication type with its transmission and hardware implications; they have an idea of the sorts of locations that will be needed; they can estimate personnel requirements. The planners may not yet have chosen a particular project site, do not know what the site will provide or allow (in scale, availability of facilities, local cooperation, for example), have not begun to negotiate and compromise, and do not know what final costs will be. But, because they have a good idea of what they want to do, and because they have expert experience to draw on, they can make some rough estimates based on reasonable scenarios, and on some indication of the range of funds that will be available.

Once a particular location is chosen and functions of the project understood in specific terms, the costs of hardware rental or purchase, installation, and maintenance can be closely estimated.

The rest of the budget is now to be drawn up. Personnel should be hired locally (note that local pay scales are operative). Costs of transmission may be a major or minor item depending on the system to be used. (Newer modes such as CATV may be more willing than older ones to abate charges.)

From one State Agency administrator's point of view*, costs are the last thing to be asked about. A procedure like this should be followed:

A. What is possible with telecommunication modes? What can be done with them? How does telecommunication respond to VR program requirements?

B. It seems rational to educate telecommunication advisors in the functions that must be performed, the goals to be met, and the problems being encountered. Then, expect to receive specific information as to useful ways in which telecommunication can address the situation.

C. If a telecommunication solution seems feasible on other counts, then is the time to discuss costs, because there may be ways of cutting costs, getting support, making funds available, obtaining cooperation from a sister agency, that differ considerably from one project to another.

D. What are the long-range possibilities? The cost-consequences may be overshadowed by long-range savings.

E. In the course of the procedure, it would be very important to bring in people who have managed a project similar to what you are contemplating, in order to learn as much as possible about problems and pitfalls, as well as benefits, and their cost-consequences.

Within and around all of the above, the following observations about costs of telecommunication can be taken as axiomatic:

A. The cost of standard telecommunication hardware that succeeds in becoming widely-accepted tends, like most popular electronic technology, to descend fairly rapidly and to come to rest at a reasonable level. This has been true of videotape recorders, color television sets, transistor radios, and many other items. It probably will be true, as well, of satellite transceivers, miniaturized television cameras, and holographic equipment.

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* These comments are paraphrased from remarks by Adrian Levy, Associate Commissioner for Vocational Rehabilitation of the New York State Department of Education.

B. Start-up costs of telecommunication systems are high and will almost certainly increase Agency capital layouts, operating budgets and released-time of some staff in the initial year. The only reason we accept these sharp increases is the usual one: they are investments against a future in which successful telecommunication alternatives (spread over a far greater client-professional base than could be handled by traditional methods) will certainly cost less than current methods.

C. A substantial amount of hardware in use today will be outmoded in five years. This reflects not planned obsolescence but real progress, and there is no end in sight. What this means is that telecommunication projects should not count on saving money by using equipment whose full depreciation has been taken; simply bear in mind that the new gear in five years will be not only better but, probably, cheaper; it will enable more participants to transact essential business, with greater ease and convenience.

D. It is a serious mistake to embark on use of telecommunications unless prepared to keep the project going. Users and staff must become sufficiently familiar with it to create and take advantage of the full range of capacities and unanticipated advantages with which human/technological systems are invariably endowed.* Throughout this study we have referred to a minimum three years of project support, assuming responsible planning and close but adequate budgeting. The figure is arbitrary, based on observations and intuitions of the author and other telecommunications professionals.

E. As operating staffs become aware of constancies in regularly–recurring activities and of the technological constraints and capacities in their system, they become vastly more efficient than they started out. One system's beginning history already has been noted: after 18 months of operation, the previously-inexperienced staff in the Reading, Pa., experiment, although reduced to half its initial personnel, was capable of handling more than twice as much scheduled operation as at the beginning of the system's life. The cost implications are clear; if planners are justified in expecting a similar reduction in need for personnel, they should establish, from the outset, policies that can take advantage of the phenomenon.

F. Spreading of costs over a number of users has been successfully accomplished in a few systems, with the likelihood that such practice will increase. In any case, planners would be well-advised to consider forming partnerships with other users at the outset of designing and implementing projects. Many telecommunication systems have gone through long initial periods of great underutilization because they were geared to accomplish only a small number of tasks for relatively small populations.

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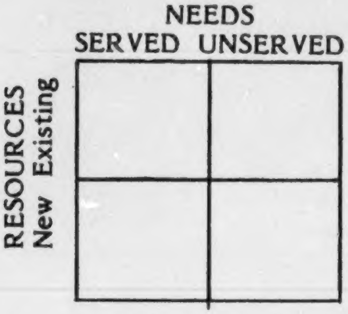
* There is nothing mysterious about this. Any reputable technology was designed by people to facilitate, enhance, multiply and magnify human capacities. Technologies are extensions of ourselves and enable us to be more of what we are.

3.3 Planning options with and without new resources

The following Table 4 is a simple heuristic tool. It is designed to suggest to planners what their future options may be with regard to applying resources to needs. In most cases, the table says, needs either are being served or they are not being served. Resources for meeting needs either are in existence or must be found. Almost any of the Agency's needs can be considered in relation to existing or new resources, as the two factors are expressed in the four-square matrix.

Table 4

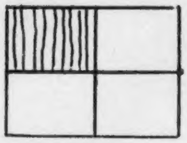
PLANNING OPTIONS WITH AND WITHOUT NEW RESOURCES



EXERCISE: RANK - ORDER FUTURES ACCORDING TO NUMBER OF EMPTY CELLS AND VALUE ORIENTATION OF AGENCY.

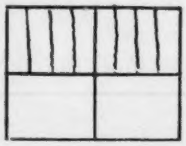
No Added Resources

FUTURE #A



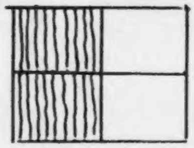
NO CHANGE IN RESOURCE LEVEL OR ALLOCATION

FUTURE #B



SUBSTITUTING FOR OR STRETCHING EXISTING RESOURCES TO SATISFY UNMET NEEDS

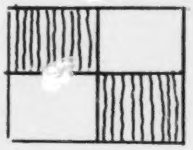
FUTURE #C



NEW RESOURCES FOR IMPROVING OR INTENSIFYING EXISTING SERVICES

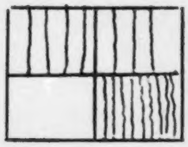
Additional Resources

FUTURE #D



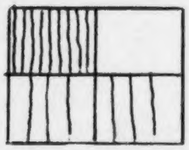
NEW RESOURCES FOR MEETING UNSERVED NEEDS ONLY: EXISTING RESOURCES APPLIED AS BEFORE

FUTURE #E



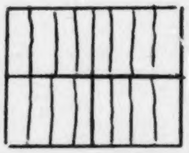
SUBSTITUTING FOR OR STRETCHING EXISTING RESOURCES WHILE APPLYING NEW RESOURCES TO UNSERVED NEEDS

FUTURE #F



NEW RESOURCES STRENGTHEN EXISTING SERVICES AND MEET UNSERVED AREAS OF NEED.

FUTURE #G



EXISTING RESOURCES STRETCHED OR SUBSTITUTED TO MEET SOME UNSERVED NEEDS WHILE NEW RESOURCES ARE USED TO IMPROVE SOME EXISTING SERVICES AND TO ESTABLISH NEW ONES.

Chapter 4

Designing a Short-Range Process Model in which to Develop Longer-Range Thinking and Projects

As its title implies, this chapter constitutes a practical method for designing the Process Model* which we have repeatedly insisted is a prime necessity for serious planning. The planning group must first have decided the need or service activity which should be addressed in the model. This will have been an exercise in the assessment of the Agency's overall priorities and in coming to grips with the question posed in Chapter 3: Will it be more reasonable to address a need which ranks both as a high priority item and as a difficult problem in delivery, or to address a less sensitive peripheral activity? Put baldly, the choice was: to select an item about which everyone cares a great deal but seems able to do nothing about; or, to select an item about which no one cares much and is peripheral to the agency's concerns.

The method for designing the model as set forth here tends to lean in the direction of the former choice.

In addition, the planning group will have reviewed other factors, especially what is suggested at the close of Chapter 3: Will the Agency be able to use existing program resources or will new resources be required?

The process by which the planning group arrived at its selection of need or activity to be addressed will have been accomplished, with or without application of the criteria suggested above.

What is most important is that a Process Model be designed and implemented, that its planning and execution, operation and participation, involve the active work of a wide spectrum of clients and professionals, and that these activities follow the spirit if not the letter of the ensuing chapter.

Having made its choice of the item(s) to be addressed in the Process Model, the planning group should first review the item(s) in relation to the material in Chapter 1 which begins with "Questions about interactions between professionals and clients...," proceeds through "Auditory and visual components to be reproduced by telecommunication" (Table 2), "Comparison of communication capacities in various telecommunication technologies," and ends with Table 3.

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* Hereafter also referred to as the model or the project.

4.1 Criteria and questions for selecting activity areas

This is another review of the item(s) selected for a telecommunication response in the model. Let us assume that the item is something like "Provision of vocational rehabilitation services to severely-disabled homebound young adults" or "Continuing education for VR professionals." The item has been reviewed according to the material in Chapter 1 and we will assume it has been concluded that there is a good fit between the communication requirements of the item and one or more telecommunication environments. However, if no telecommunication technology can provide the essentials of required communications at this basic level of analysis, search for a telecommunications alternative should be abandoned. If telecommunications technology can provide the communications essentials, planning can proceed. Is more than one VR program (item) being considered for implementation? If so, eliminate all but one, on the basis of these criteria:

- Manageability
- Probability of success
- Ease of funding
- Learning potential and demonstration potential

and, second, on the basis of these questions, all of which should be answered positively:

A. Will or can the model project involve a wide spectrum of VR professionals?

B. If the project is client-oriented, will or can it involve a wide spectrum of potential participants? (A program aimed at the severely-disabled homebound, for example, would not be expected to limit itself to clients in that category. On the contrary, program aims could and should include substantial contacts with non-homebound clients and others, as well as ex-clients, family members, representatives of business and industry and of agencies and organizations interested in the welfare of the handicapped.)

C. Are there some numbers of telecommunications systems in existence capable of implementing the requisite communications? Are the numbers of similar systems likely to increase, quite aside from the stimulus given by VR use of them?* (Such as cable TV, microwave networks, statewide audio networks, Supplementary Communication Authorization — SCA, and, in large states, satellite links.)

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* See O'Neill, Olenbush, Paquette, Walcoff, Zobrak (1976).

D. Does the program require only available standard hardware and not depend for its implementation on prototype or untested hardware?

E. Do rough cost estimates indicate that implementation can be made operational and supported for at least three years with currently-available and/or projected resources?

F. Important optional question: Are there sister agencies or institutions with interests in welfare of handicapped (such as blind, mentally-handicapped) or parallel interests in other populations or services (such as aged, chronically-ill, health care) which should become involved with you toward time-and-cost-sharing of whatever system you develop, at some future date?

Decide to commit to implementing a Model Planning Project. Formulate criteria/basic constraints: Budget boundaries, Program objectives, Definitions, Deadlines.

4.2 What the model must provide

The following brief Table 5 raises a number of specific questions, all of which may already be answered in the minds of the planning group; but now, the answers should be made as explicit as possible.

Table 5

What the model must provide

	WHEN	HOW	WHERE	WHAT	WHO
	Short	Time: Duration and Frequency of interactions	Locations: Number	Training	Supports: Staff and Volunteer
ANGE:	Medium	What communication capacities?	Locations: Facilities	Socializing	Community Services
	Longer	At what level of refinement?	Transportation needed?	Other Services	
		To whom?		Peer-Counseling*	Community at Large

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*Peer-counseling refers to exchanges of useful information among clients.

4.3 Selecting a particular telecommunication system and locale

At this juncture it is likely that the planner already will have a particular system in mind. Any system is intimately related to a locality or region which must be further studied for its current population of VR clients and professionals, its capacity to provide supports, for locations it can make available, and for the planners' senses of cooperation from government, business, and community at large. At this stage, site visits will have to be undertaken. Seek positive answers to the following:

4.3.1 Telecommunication System

A. Does the local telecommunication system measure up, technically, to what is required?

B. Does the system cover the locality sufficiently? (SCA: plenty of receivers, widespread?; CATV: cables throughout area?; Telephone lines — for keyboards or voice-conferencing: available almost everywhere?)

C. Is the system sufficiently available? Does it have enough technical capacity at the times and for the durations anticipated? Can the system provide room for subsequent expansion of VR telecommunication activities?

D. Are charges for system use reasonable? Is management prepared to abate charges other than costs, if the project's use of the system requires trial and error experimentation? (Telephone companies charge fixed tariffs, with little room for negotiation; CATV systems attempting to achieve good positions in their communities and to develop new business, often will postpone profit mark-ups until new applications — such as are likely to occur here — have achieved a measure of technical stability and assured usefulness.

E. Is system management cooperative, willing to provide adaptations necessary for interactive terminal equipment, prepared to detail personnel to work closely with the model project?

4.3.2 Target population

A. Is there a broadly-representative cross-section of the target population (both client and professional) in the locality?

B. Does the State Agency have good connections to the target population?

C. Is the target population, particularly client population, well-organized in consumer groups, by rehabilitation agencies, or both?

D. Is there a history of good cooperation among client groups, between client groups and rehabilitation agencies?

4.3.3 Local supports

A. Other than clients' homes, are there sufficient numbers of locations to which handicapped people have ready access, which can be integrated within the local telecommunication system, and are available for use by handicapped people at the times and for the durations required?

B. Are local social service agencies prepared to cooperate with the model project, to give personnel time for development of informational materials and telecommunications formats?

C. Will local voluntary organizations cooperate with the model project (providing part-time assisting personnel at telecommunication locations and emergency transportation, for example?)

D. Are local government and business leaders enthusiastic about the prospects of having the model project, and can they be expected to cooperate with it in both short and longer range? (If the project is successful, local leadership should be asked to help the project find long-term support, to the extent there are local benefits.)

E. Do the planners feel they can enter into productive partnership with the local agencies, individuals, and institutions who constitute political power with regard to handicapped people and their welfare? (It may very well be that some of these are in sharp disagreement and competition with others, but the Process Model, if it is to succeed both in its own local service terms and as a planning model, will have to count on cooperation from most, if not all of them.)

It is very important at this stage to keep in mind that the simplest, easiest-to-resolve problems in telecommunication systems are the technological ones. "People Problems" are the difficult ones. They do and will arise in the design, implementation, and evolution of any system. None is utterly insurmountable, but they tend to be persistent and new ones continue to emerge, often from unexpected quarters. Naturally, the model project will have its own strong leadership, and the top person — whatever other roles she or he performs — must be a skilled negotiator. Nevertheless, planners must assess answers to the criteria and trust their own intuitions in answering the question: Is this a good community in which to place the model planning project? It may be the most important question they have to answer.

4.3.4 The local task force

At the time that a specific locality is chosen, the Planning Advisory Group should be augmented with local people who are in effect a local Task Force. Some members of the Planning Advisory Group not from the locality may be included in the task force; certainly, members of the PAG with specific expertise in the program areas (items) to be addressed in the Process Model should be included with the expectation that they will help strongly to carry out the objectives established for the project by the planning group.

The Agency's principal staff member (Director of Telecommunication) will be the project's supervisor and should be a member of the local Task Force.

Other local members of the Task Force should include:

A. The manager and chief engineer or system engineer of the larger telecommunication system in which the project is embedded (if it is a system such as local cable, telephone company, SCA, a microwave duplex system of interactive television).

B. The heads or leading Representatives of participating and cooperating local agencies.

C. Representatives of local client organizations or individual handicapped people who can represent the client population, if it is to be a handicapped population. If the population is professional staff, then representatives of that group.

D. Local government officials with authority to make decisions or influence actions which have a bearing on the welfare of the project.

E. Other local representatives as clearly indicated by the project's activities, needs, and obligations.

4.4 The Process Model as a system within the local telecommunication/social system

At this point, a number of things begin to happen at once:

A. The Project Manager and Consulting Engineer are engaged and begin to work. Their qualifications will vary according to the nature of the telecommunication mode, the nature of the project and its target population; but their general qualifications should include:

Project Manager: Thoroughly familiar with the telecommunication mode in terms of the communication it facilitates; previous experience in the mode; previous experience in organizing groups of people around common objectives, such as community organization or educational administration; capable of gaining access to local business and government leadership and enlisting cooperation.

Consulting Engineer: Expert in the telecommunication mode, with previous experience in adapting the technology to the specific needs of the users.

B. Consulting engineer and planning group's telecommunication consultant must become thoroughly familiar with the larger telecommunication system in which the Model is to be embedded so as to understand its capacities, constraints, and idiosyncrasies from the standpoints of technology, present service configuration, management, and staff functions.

C. The Project Manager should be involved in the above activities as much as time will allow, but can be briefed on details by the consultants. The Project Manager must spend most of her/his time becoming well-acquainted with those community leaders whose attitudes and decisions will bear directly on the project. Listening to local social service, rehabilitation, government and business leadership, and guiding the design so as to avoid unnecessary conflicts and to develop maximum cooperation, are major aspects of the Project Manager's job. (This does not mean reflecting every prejudice and whim of the local establishment; it does mean seeing members of the establishment as supporters of the project and explaining to them how they can help make it worthwhile.)

D. It should be evident from the foregoing that, no matter how modest the project may be in budget or other dimensions, it must be seen by all concerned, including the community at large, as an important initiative in commanding technology to human service. With good planning, it should not "fail"; but it surely will have difficulties, as anything new and unusual must. It should be made clear to all concerned that they are the ones who must meet and overcome the difficulties. The project cannot be kept a secret; on the contrary, it should seek to become well-known, to invite the widest possible participation, to invite criticism, and to change in the light of demands of its users and of criticism. The community must know the project and be allowed to have and express feelings about it if it is to feel the project belongs to it and is, therefore, a source of pride.

E. The Model's first goal must be to work for its target population: to meet their wants and desires. If it does this, it will move forward, become an evolutionary, dynamic model. If it does not serve its target population it will be no good to anyone, certainly of no value as a planning model.

4.5 Questions about the users of the system

Select the interacting locations for the project sub-system. A few of these may be traditional points for delivery of service or training, but most will be elsewhere, because of the reasons for discussing telecommunications alternatives in the first place. Locations will fall into two categories, homes and communication centers. The former will mostly serve individuals and their families; the latter, groups, or numbers of individuals (and may be located institutions or neighborhood facilities). These questions need to be answered about the constitution of the user group and where they will participate:

A. To whom is primary access directed? Clients, professionals, field staff, administrators?

B. Are there conditions of membership in the prospective user group? Clients of particular agency or agencies? If specific handicaps are involved how tightly or loosely should these be defined? Professionals from particular agency or agencies? What qualifications, specialties, areas of responsibility?

C. Will access be from homes or from centers? How many? Any restrictions on distance or location? Preferred areas? Based on the above — and any other questions reflecting local conditions — what will be the specific locations involved?

4.6 Questions about technical components

A. What will be the project's system configuration? (Part of the answer is controlled by actual locations)

B. Is switching required? From what point(s)?

C. Will existing hardware be used? (For example, will participants use home TV sets or telephones?)

D. What new hardware will be required? (Bear in mind that only readily available hardware should be used. It should be standard, so that replacement is simple.)

E. Can the required hardware be obtained locally? Can it be serviced locally? (If not, a very serious drawback looms. This is one place where the axiom that technical problems are easiest to resolve is not true. Lack of replacements and repair can close down a telecommunications system. Fortunately, however, standard, readily-available hardware is, by definition, less subject to these problems.)

F. Can hardware be obtained on loan or rental? This should be preferred, initially, in order to try out hardware through the simulation phase (below) before committing to long-term lease or purchase.

G. Draw up close cost estimates on acquisition, installation, maintenance (±10%).

H. Will staff of the larger telecommunication system in which the model is embedded need to understand the project's prospective hardware? If so, and they are not already familiar with it, can they be given the required time for briefing? Do they want to understand the project's hardware? Will their management make them want to by requiring them to?

4.7 Staffing -- criteria and some suggested positions

At this point, basic system concepts and technological requirements are understood (to the extent they can be without direct experience). Next, formulate staff table, with qualifications, and budget the project for start-up and three years of operations. The Project Manager should draft the staff table. This will be unique to the project. Here are a few suggestions:

A. Day-to-day operations probably will require a full time Systems Coordinator with a good knowledge of the telecommunications to be used, and of the systemic imperatives of the type of overall system in which the project system is imbedded (such as audio conferencing networks, CATV, duplex microwave, etc.).

B. If the project rests on neighborhood communication centers (NCCs) it may be best that each be supervised by a Center Coordinator who can give continuity to its activities, welcome participants, and show them how to use equipment. Whether these are full-time or part-time employees depends on times of interactive sessions, numbers of persons engaged in activities, amount of preparation of interaction formats from NCCs, as well as other factors.

C. It is likely that VR clients and professionals, as well as local service agency, government, and other guests and participants will also require initial assistance in devising and preparing formats for interaction (4.11, below). In the beginning, such assistance will have to be given by a staff member or consultant especially qualified in communication skills who can devise and adapt formats to the program and to participants' requirements. In time, participants themselves should be expected to do these things, as well as to teach the skills to new participants.* The System Coordinator's job may require skills not available locally, but every effort should be made to fill that position and all other project staff jobs from the local area.

D. Staff positions below the level of System Coordinator will not require previous technical training,** but personnel will need on-the-job training. Basic qualifications include: high school diploma or better; willingness and capacity to work long and hard in formative stages of the system; ability to learn operation and simple preventive maintenance of hardware; respect and openness with handicapped people; a genuine desire to serve.

4.7.1 Budget for start-up and three years of operations

See again "How to think about costs" in Chapter 3. Budget should be subject to review after first and second years to allow for shifts in emphasis, changes in amounts of time required in program, expansion, and efficiency. Make sure that each budget item is accompanied by a brief statement of rationale; this will make it easier to understand and to explain the need for shifts within the budget in later phases as well as to maintain accountability.

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* Can participants learn skills involving computer programs as well as how to chair discussions and develop curriculum? Emphatically, Yes. Young handicapped teenagers at Human Resources, Inc. in Albertson, N.Y. are mastering intricacies of computer programming. Elderly people and service professionals in Reading, Pa. are producing and presenting new formats for interaction that cover a range from information and referral to adult education to popular participation in entertainment.

** At the time of this writing very few schools and colleges provide education for interactive telecommunications systems personnel.

Get formal approval of budget and proceed. Set a date for formal opening of the Project.

4.8 Simulation before final commitment to specific locations and hardware

At this point you are ready to hire staff and perform simulations of system.

A. Advertise availability of staff positions in local newspapers and through organizations and publications of handicapped.

B. System Coordinator should be engaged a few weeks ahead of remainder of staff. (Note that this position may not be able to be filled locally because of likely high degree of technical skills required.) System Coordinator should take part in hiring of the rest of the staff. One way to do this is to have System Coordinator narrow the field of applicants down to two or three competing for each position with the Project Manager then making the final choices; in this way Project Manager's judgement will have been exercised among candidates who are all acceptable to System Coordinator.

C. System Coordinator trains staff in basic technical operations (with equipment on loan or rental? See above.)

D. Form Program Committee to spell out the project's objectives in specific local terms. Membership should come from local representation on Planning Advisory Group and local target population of clients/ professionals/ significant others involved at 2.5 above in discussions of test scenarios. Project Manager should serve as Chairman Pro Tem. Add further people to Program Committee as representatives of new services and client groups are incorporated within the project.

E. Set up simulated system and conduct a series of simulations of the kinds of communications that will be transacted on the project's sub-system when it is ready. Locations for simulation will suggest themselves in the context of the model project being planned (such as offices of participating agencies, schools, hospitals, offices of CATV system, local government offices).

Simulation is a laboratory interface of representative actors and telecommunications technology. It provides an early reality test and an orientation for participants in the planning process. Simulation is especially important also, from the point of view of the handicapped person, to discover whether proposed items of terminal hardware are usable, and — if not — how they may be adapted for use.*

Simulations should not be regarded only as an exercise in mechanical functions. It should proceed from such questions as: What are the communication needs of the potential users? Must they both see and hear each other, as in face-to-face interaction (e.g. Interactive Television)? Can they accomplish what they need to just by hearing each other (e.g. Conference Telephone or Interactive Radio)? If they are limited to hearing, do they need common visual points of reference, such as printed material, graphics, or 3–dimensional items? Must the common visual reference be in motion, as in demonstrating and discussing an assembly process or physical therapy technique (e.g. One-way video, two-way audio interaction)? Are their communications needs limited to written language (e.g. Print or Transmitting/ Receiving Keyboards)?

The next step in simulation (after determining these basic communication issues and organizing the laboratory situation so as to provide an approximation of what is needed in spatial arrangements similar to home, office, or institutional settings) is to conduct "real" interactions. Participating volunteers — professionals and clients — have real business to conduct with each other in the course of their real lives; let them conduct this business in the laboratory. Admittedly, time constraints and other arrangements may make such actuality testing difficult, but it is recommended if only to stress the desirability of making simulation approach reality as closely as possible. The alternative is to construct scenarios based on actuality.

Simulation is extremely valuable to planners; it helps to guide the ongoing planning activity and to avoid mistakes. It should not, however, be expected to provide all the answers. As suggested heretofore, satisfactory use of technology for interpersonal communication requires time and patience, in actual settings and actual social and task-oriented interactions.**

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* Technological adaptation to the special needs of handicapped people has been the subject of a great deal of productive work. For adaptations related to telecommunication, see Shworles (1970, 1972), Kafafian (1973).

** Simulation, as other steps in a planning process, should be motivated by the concept of Problems in Search of Solutions. However, when and if planners can avail themselves of laboratory settings in which to study telecommunication, they should not hesitate to indulge in the heresy of Solutions Looking for Problems. Most of us are quite unfamiliar with modern telecommunication technology, and the opportunity to play with it should not be regarded as frivolous, because this can suggest solutions we did not realize were available for problems we have not satisfactorily solved.

Telecommunication laboratories, as such, are not readily available to planners. Simulations may sometimes be organized, however, with the cooperation of local cable television companies, audio-visual departments of schools and colleges, and specialized telecommunication systems (such as medical closed-circuit systems). Obviously, there is no hard and fast rule, and no current organization of such facilities for simulation purposes. The initiatives and connections of VR agencies will here come into play and will find adequate laboratory facilities as cooperativeness and perseverance enable.*

Even if the project you are planning can now be set up in its actual locations, regard the exercise as simulation and so refer to it. This gains the psychological benefit of being able to experiment freely for a short while and to make whatever adjustments seem necessary without feeling a major decision must be taken when anything needs changing; it also preserves an uncommitted status with regard to the borrowed or rented hardware. Simulation should proceed long enough to ascertain what technical modifications are necessary, to eliminate unnecessary hardware, to begin to develop rational and easily-understood system protocols, and to give all concerned — Program Committee, staff, Advisors, and local client/professional representatives — a clearer idea of the capacities and limitations they will be encountering. Simulation should not go on too long, however; commitment to a formal opening date will obviate an overlong simulation period (and other problems, as well, the chief one being delay in fulfilling expectations of the target population).

4.9 Criteria for programming

With the participation of the Program Committee, develop criteria for what to program, at short range and longer range.

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* Help in identifying telecommunication resources is to be found in two studies recently funded by the Rehabilitation Services Administration. See O'Neill, Olenbush, et al. (1976) and Department of Commerce (1976). The former consists principally of a set of guidelines, with specific contact addresses in appendices. The latter, a more comprehensive study in this area, is in two volumes which are described in its preface as follows:

> "Volume I contains a summary of the survey (of VR use of telecommunications as well as usable telecommunications systems) and describes the available systems and the possible vocational rehabilitation uses. Volume II is in three parts: Part A is a directory of telecommunications organizations and personnel, Part B is the survey of 15 representative states, and Part C is examples of vocational rehabilitation programs using telecommunications."

A. In general, because telecommunication systems are based on new means of interactive communicating, earliest uses should be designed to enable participants to learn how to do their basic communicating. Therefore, early on, stress socializing and entertainment, rather than insisting on the negotiation of education or training materials, or other fare which, if taken up before social interaction has been established, may tend to produce a didactic and formal tone.

B. Also at short range, participants should be encouraged to know that the system is theirs, for them to use in ways useful to them, not merely in ways others think will be beneficial. A principal means to this end is to encourage them to develop their own interactive format or to select from among pre-planned formats (such as in CAI — computer-assisted instruction).

C. Devise a schedule for interactive formats. In other words, decide how many hours per day, at what times, what days of the week interactions will be implemented. What will be their substance? (Note: regular schedules of regular series of interactions constitute a reliable, dependable set of activities just as in other social and educational contexts. CAI systems may allow greater freedom of individual activity, but even they will usually be "on-line" only at certain stated hours.)

D. Decide on a starting date for program-oriented sessions (training, counselling, education, or other). Plan to publicize it widely via the project system and other media. In this way, activities and formats developed in the earlier socializing and entertainment period can be utilized for the benefit of harder program material.

4.10 Maintaining flexibility

We are at a juncture where each "how" of speaking, hearing, seeing, and physical action is medium-specific; therefore generalization is difficult at the level of communication activity. However, some things can be generalized at the levels of communication objectives and of participants' attitudes. One of these is to suggest you maintain as much flexibility as possible, consistent with program goals. At the outset of this suggested set of procedures, it was emphasized that telecommunications environments are only beginning to be explored. We know they can be powerful in their capacity to promote needed and wanted communication but we have discovered no hard and fast rules associated with their use. On the contrary, project after project in interactive telecommunication reports that its most significant consequences have been ones that were not anticipated at the planning stage and — in hindsight — could not have been anticipated, because they arose from phenomena unknown to the planners.* The danger, then, in insisting that the new environments be used only in ways planned by preconception is that such constrained use will delay the emergence of more beneficial attributes.

Flexibility may sound antithetical to the proposition that planning is intended to reduce uncertainty. What is meant by flexibility, however, is neither anarchy nor license, but rather a willingness to be open to trial and error of alternative methods of use. A simplistic illustration: explore different methods of turn-taking for participants who are communicating via audio where all can hear each:

- Strict rotation, by number.
- First signal, first talk, where individuals each have a button to press.
- Group leader or teacher calls on individuals by name.
- Anyone talks at will, within the framework of social constraints that defines what is permitted as well as what is rude.
- Individuals in Group A can talk during the first period (say, five minutes); then individuals in Group B for the next period, then Group C, D, E, etc. until the round starts over. It probably will turn out that each of these turn-taking methods implies a different set of dominant interactors, a different set of preferred subject matters, and certainly a different set of communicating styles. But what would each imply for the long-range effectiveness and usefulness of the project system? We could not know unless we maintained the flexibility to try them.

Flexibility implies considerably more, in terms of: scheduling, amounts of time devoted to specific subjects and contexts, tolerance for differing points of view, and training approaches and methods.

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* One problem is seeing the new technology in its own right. Automobiles first were called "horseless carriages." This locution preserved the notion that they were merely substitutes for "horsed carriages." Shortly, they proved not only to be very superior substitutes, but also to have more unique attributes than ones that were shared with the former transportation device.

4.11 Formats for interaction

System coordinator, staff, and participants, together should begin as early as possible to develop a variety of different formats for interaction. The concept of "formats" is that interaction can be started, promoted and sustained in a number of ways.* A few examples:

A. The "trigger." After a short, well-prepared presentation that is both informative and provocative, participants will respond spontaneously.

B. The well-informed interviewer - discussion leader. The interviewer/leader opens up a resource person's expertise along productive channels, then guides group discussion along those channels.

C. Relating to a common visual source. Prior to a conference, all participants are provided with uniform graphic materials which are easily oriented for common reference by all.

D. The opinion poll. Controversy first polarizes participant opinion, then encourages learning. Most subjects have a controversial aspect; when this is skillfully exposed, participants will tend to choose up sides. In this context, examination of the subject immediately proceeds from an interesting situation which spreads its benefits to more salient details.

4.12 Stategic intervention to optimize use of the system

From the outset, a telecommunication professional (project consultant or other) should observe and criticize communication in the system with an eye toward improving it. Criteria for this task are:

- The mutual understandings which participants themselves want to arrive at.
- Full expression of what participants want to project.
- Optimum transmission of signals (digital, auditory, visual) to participants in ways they can best receive them.

The recommendations of this supportive activity should be in these categories:

A. Technical adjustments to improve perception and expression.

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* See Park (1978, Chapter 4) for interactive television examples from the Reading, Pa. project.

B. Physical arrangements to improve conditions for perception and capacity for expression.

C. Protocols and conventions to improve flow of communication.

D. Standardization of constant factors. (Identifying constant factors and pointing to methods which treat them the same each time they occur, not as unique events each time.)

Recommendations may: confirm an action or behavior already in use by a few; suggest taking a next step in a logical sequence already underway; urge abandonment of a behavior or method that frustrates communication (such as, for example, an over-structured convention for turn-taking).

Recommendations can be made at staff or program meetings, but they are usually best made to an individual who is in a key position as regards the particular recommendation, and who must then take the initiative (as well as the responsibility) for raising it among participants or colleagues who are directly involved or affected by it. This means that the telecommunications professional observer must make the case for a recommendation and that the case can be accepted or rejected by the participants in their own frame of reference.

A fundamental issue is sure to arise in many guises: How much should project activities be dictated by participants? There is no simple answer, but a trade-off has been noted between the perception that one's interests are being served on the one hand and enthusiasm for participation on the other.* It is by no means clear that this means participants must control the system (although in some instances they do participate in policy decisions and control their execution). The salient features seem to be two: the system's consistency in reflecting the actual needs and wishes of participants; and participants' (as opposed to project staffs') control of the proceedings during interactive sessions.

In its early weeks and months the system will encounter many problems and frustrations. Strategic intervention probably makes its most important contributions by helping to resolve these, and in reassuring key participants that most problems are easily resolved and that the difficult ones can be resolved if the people in the project want to resolve them.

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* Professionals who felt that telecommunications systems were merely unwanted forms of peer review or additional work — uncompensated — have hastened the systems' demises through lack of cooperation. By contrast, professionals and clients who feel that systems provide important dimensions otherwise lacking in their lives and work can be counted the systems' strongest supporters.

Chapter 5

From Short to Long Range: Using the Process Model For Planning

The objective of designing and developing the Process Model was always two-fold: to mount a project which would have a good chance to succeed in terms of the population it was to serve, and to provide a demonstration test-bed for further planning. This chapter attempts to set out some suggestions as to how the second part of that overall objective may be pursued.

5.1 How to use the Process Model for further planning

It is clear that the project, as envisioned above, is based on an evolutionary model. It maintains flexibility, reviews and improves itself, and is open to new inputs. It should attract and be useful to a wide and growing representation of its program-targeted population as well as supporting significant others.

The model exists as a place where participants can and do engage in trial and error of communications in pursuit of their own wants and needs for services, information, and the extension* of human contact. Care has been taken throughout this document to avoid confusing the planning procedure with quantification research. When one has noted that the principal — frequently the sole — findings from telecommunications research experiments have been accounts of previously-unanticipated consequences, the reason for this should be clear. Quantification methods impose yardsticks designed to measure, on particular scales, within particular dimensions, things that can be counted. At present, our principal significant findings about telecommunications have been about phenomena for which no methods of counting were in place.** When telecommunications settle into steady states of universally predictable behavior — if ever they do — we may be able to set up experiments to count things worth counting.

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* Not for maintenance of human contact (although this might be true in some cases of extreme physical isolation). Previous experience with technological aids to human interaction, whether promoted by the use of automobiles, telephones, or interactive cable television, indicates that face-to-face contact is increased, not diminished.

** For example, we see these tendencies: Patients and physicians in telemedicine encounters tend to feel more relaxed and informal than in the office; patients tend to open up more quickly and reveal details of sexual frustrations and anxiety; speech therapists feel they can do their jobs as well, but differently; some radiologists have claimed they can read x-rays better via television or slow-scan, but again, they have to read them differently; old people in Reading, Pa. say that their interactive system has given them a reason for getting up in the morning; a multi-point system in Central Maine gives remote professionals enough contacts with colleagues to enable them to continue to work in isolation. All these phenomena can be quantified, after the fact, but what quantifying research methods would have discovered the fact?

In the meantime — and it probably will be a long meantime — careful observation of projects designed to work for their participants will reveal behavioral tendencies that need to be allowed further trial and error. Observation will reveal basic stuctural truths, such as that a single camera-monitor unit is the sine qua non of interactive television; that problems of audio, and thus hearing, are far more destructive to communications than are problems of video; and that users do not need color in video transactions but, nevertheless, prefer it.* More important, observation and participation will develop in planners a grammar and syntax of telecommunications that will enable them to conceive of and implement new and different applications of telecommunications to VR programs.

The following five steps should be taken concurrently, not sequentially.

5.2 Redirecting the focus of the planning group

Redirect the focus of Agency telecommunication staff, consultants and the Planning Advisory Group to planning for new futures. From the beginning of the process to date, the PAG has helped to determine the specifics of the model Planning Project. At this time, it represents an invaluable resource for ongoing planning. Agency telecommunication staff and telecommunication consultant(s), assisted by Advisory Group, should perform tasks and respond to questions as indicated:

A. Review and comment on the activities in the next four steps (Advisory Group must receive current reports on these activities.)

B. What impact are telecommunication activities having on organizational arrangements in the participating agencies, among professionals, and among clients?

C. Do the above impacts suggest any need for changes in staffing to reflect realignments of responsibilities? Have telecommunication activities suggested new jobs, elimination of old jobs, consolidations, task reapportionments? Does telecommunication activity point to a need for analysis and reevaluation of current operating procedures?*)

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* These findings were not well-known until recently. New ones are now being observed: handicapped teenagers find that the CAI terminals in their homes attract visitors, some of whom become friends; elderly people's speech and appearance improves as they become regular participants in interactive television. It is too pat to dismiss these as novelty and Hawthorne effects.

D. Determine long-term methods for financing telecommunication in VR. Can these activities be supported in toto by VR programs or do they require joint funding with other agencies? Should the state VR Agency seek other, outside utilizers for its telecommunications sub-systems, as a way of spreading costs?

A business/management expert should be added to the Planning Advisory Group (if not already present) because of the emergence of issues of increased utilization, organizational change, and reliable long-term funding.

5.3 Evaluative concepts

Review the technology and its configurations, by criteria of Sufficiency, Reliability, Adaptability, and Utility, which were illustrated in Chapter 1, at 1.7, "Salient experiences from telecommunication projects." This exercise should be carried out by the Agency's telecommunications staff and Engineering Consultant, with assistance and cooperation of the System Coordinator. The gist of this exercise is to ascertain how well the technology works for its users as a group, to publicize successful application and to seek productive research and development of useful technology.

A. Sufficiency refers to the degree to which the communications under consideration provide images or sounds (voice and other) that are clear enough, discriminating enough to perform the auditory and/or visual tasks that characterize the service to be provided.

B. Reliability refers to transmission of the electronic signals that carry the communications. This criterion takes on greater importance where distance, remoteness, and adverse weather and geography are significant features of the situation it is also more significant with new and relatively untried technology than with established communication modes.

C. Adaptability refers to the capacity of the technology to be adapted to human communication needs and to the capacity of humans to adjust their behaviors to gain full advantage of the technology. These two capacities may be studied somewhat separately but remain conceptually married: each can and should be adjusted to adjustments of the other. The special requirements of handicapped people — in terms of perceptual constraints, operation of equipment, speech and gesture, and specialized communication techniques (such as signing and tactile communication) — put added emphasis on this criterion.

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* In Miami, Florida, a telecommunication alternative to existing methods caused a revamping of the latter when, in the course of discussing changes in personnel duties, it was discovered that there was no clear definition of existing methods. In a telecommunications project in Quebec, evaluators realized that their current system was potentially better than they had been giving it the opportunity to be.

D. Utility refers to the degree to which ordinary non-technical participants can and do conduct the business they need to and want to, without technical assistance other than what is required for the maintenance and normal operation of the telecommunication system. However well people may be able to adjust to the requirements of the technology and to perform whatever technical operations are necessary (such as using a keyboard, operating remote camera controls, placing materials for transmission, engaging switches, or manipulating a "light pencil") to what extent will they actually do so?

5.4 Focusing on communication problems of individuals

Focus on communication problems of individual participants. This exercise should be carried out by the telecommunication consultant(s), with assistance and cooperation of the System Coordinator. It attempts to answer questions such as:

- Is participant having difficulty operating terminal equipment? Why? Can the condition be corrected? What expertise or skills are required to correct the problem(s)?

- Is participant having difficulty understanding or being understood? Does he/she have unresolved seeing/hearing/speech problems? Can these be ameliorated?

The gist of this step is to attempt to identify and resolve the problems participants are having in a real-life context, to develop better guidelines for future participation, and to spur research and development in technology usable in VR.

5.5 Trying out new technology

Try out new hardware. Frequently, new devices come onto the market. They may exhibit a wide variety of functional emphasis, capacity, interface standards (to use with existing modes and systems), sufficiency, reliability, adaptability, and utility, as well as costs. Some new equipment will show promise for use in the context of VR. It should be shown and/or talked about among participants of the Process Model project. If possible, it should be put to use in the project, at least on a trial basis. Participants should be asked for suggestions and comments about it. If new equipment turns out to be useful in the context of the project, efforts should be made to borrow or rent it, possibly even to buy it.

The Process Model should be willing and ready to expand its base to include new or different telecommunication modes (Adding CAI to a system based on live interaction, for example) depending on feasibility, demand, availability of staff, and costs.

This step, should be administered by the Consulting Engineer, with the assistance and cooperation of the System Coordinator.

The gist of this item obviously is to stay abreast of new and potentially useful developments in technology. Note its relationship to the two steps immediately previous, which have as one objective the stimulation of research and development of better and more useful technology.

5.6 Developing a wider constituency

Develop a wider constituency for telecommunication among potential participants in other areas of VR and related fields.

If the principal barrier to exploring and using new communication technology is fear of the unknown, then by this point the project has provided the means to destroy it. The project's professionals, clients, and others have had experience with telecommunication and can contemplate without consternation a future where various modes of telecommunication are in common use. The project's telecommunication will have comprised only a segment of the entire field, but once people have had satisfactory experiences with rehabilitation activities in one technologically-mediated environment, they can accept without anguish the idea that such activities might be carried on in other types of such environments.

It was a primary goal of the project that it must perform well for its own target population; once it did that, it would inevitably begin to produce a telecommunication cadre within the VR community.

The model project will have had its own birth pains and early founderings. A substantial number of participants, staff, Advisors, and others will have lived through this instructive period and been a part of its resolution.

The building of a wider constituency may take several forms, most of them inexplicable until the time for them, but these are a few general observations:

A. Visits from other regions, other types of programs, regional and state officials, agencies other than the State VR agency should be encouraged.* A staff member should be detailed to arrange for visits and to make visitors welcome.

B. When new telecommunication locations are being contemplated, it is only natural to assume that staff, participants, and consultants in the Process Model project will be transferred or lent, so that the people in the new location can have the benefit of discussing telecommunication with someone who speaks their own (rehabilitation) language.

C. Conferences and seminars on telecommunication can be organized around the Model Project, but include also modes of telecommunication other than those implemented in the project.

5.7 Conclusion

With monitoring methods in place, looking at a dynamic, functioning model, and a large group of planners and participants who have become knowledgeable about telecommunication through experience, the state is set for planning more and different uses of telecommunication in Vocational Rehabilitation and allied fields.

The foregoing planning procedure can continue to be used, but planners will be less likely to need to focus only on single high-priority programs that have resisted delivery. Once a substantial body of professionals, clients, and significant others have embraced the idea that telecommunication represents a wide array of desirable non-threatening means to accomplish their purposes, we should expect to see designs for multi-purpose telecommunication systems emerging within the larger community of agencies and organizations that are concerned with the right of handicapped people to lead full and satisfying lives.

Once people come to know that technologically-mediated environments represent new and different communication potentials, that they are not merely poor imitations of face-to-face environments, that they do more than merely substitute for travel to in-person encounters, we can expect a freeing-up of imaginations about the many new uses for telecommunication that are becoming increasingly available.

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* The single comment by visitors that most reveals the value of visits is: "Oh, this is what you mean by telecommunication!"

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